

12. Covers, for Baskets and Dishes.

13. Wooden Drinking Cup.





## THE

# JUNIOR ENCYCLOPEDIA BRITANNICA

# A REFERENCE LIBRARY OF GENERAL KNOWLEDGE

## EDITED BY L. BRENT VAUGHAN, PH.B.

ASSISTED BY WRITERS OF EMINENGE IN LITERATURE, THE ARTS AND SGIENGES

> VOL. I. А то Е

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# ANNOUNCEMENT.

THE JUNIOR ENCYCLOPEDIA BRITANNICA is intended to be to the masses what the greatest reference library in the world, the *Encyclopædia Britannica*, is to the scholar.

It is published with several objects in view, as explained by the Editor in his Preface, and he has performed his work successfully. The JUNIOR ENCYCLOPEDIA BRITANNICA is not published as a rival to any reference books, nor is it our purpose to detract from their value or abate one particle from the meed of praise awarded them.

That typical American citizen, Horace Greeley, once said: "I want just three books constantly at my elbow while writing—an atlas, a dictionary, and an encyclopedia of not more than four volumes—three would be better; and these books should have every article abridged as much as possible." He said also that a lengthy dissertation on any subject in a book of reference would be misplaced.

If such a set of books was needed in the busy life of so great a citizen, how much more is it needed to refresh the memory of the student, to enlighten those who have not been fortunate enough to reach the higher seats of learning, or to aid the pupils of the public schools, whose needs we have had constantly in view.

#### THE PUBLISHERS.

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### PREFACE.

In the beginning we fully acknowledge the value of the greatest reference library in the English language, the *Encyclopædia Britannica*. To those who desire a complete series of elaborate treatises covering the whole field of knowledge we would recommend the above work. It is invaluable to the scholar, and no library is complete without it.

In the JUNIOR ENCYCLOPEDIA BRITANNICA we have endeavored to reproduce the quality of the larger work and at the same time reduce and simplify the quantity, so as to furnish a set of reliable and handy reference books, which would be not only within the intellectual reach of all, but also easily accessible to the great masses of the people who are striving for a higher intellectual development.

We have followed the general line of treatment of the ninth edition of the *Britannica* (A. & C. Black, Edinburgh), in that we have given a connected view of the more important subjects under a single heading, instead of breaking them up into a number of shorter articles. The articles have been so arranged that the various parts may be easily discerned. In the articles on the Sciences we have presented the latest developments in method and in classification, but we have persistently avoided any technical treatment.

We realize that information concerning living men is most difficult to secure. Instead of writing the biographies of a great number of men of the past, who, though they may have been prominent in their own times, have left no traces in the history of civilization, we have substituted the prominent men of our own time. We have given only those men of the past, whose names are inseparably connected with the world's history. In fact, if our biographies were arranged chronologically, they would present a complete history of human activity in the field of art, literature, and science. The JUNIOR ENCYCLOPEDIA BRITANNICA is essentially an American work. In the industrial world, in particular, things American are given precedence over foreign things. Yet the work is not so emphatically American that the treatment of foreign countries is narrow or insufficient for ordinary reference. The newer countries — those recently opened to civilization — have been dealt with at considerable length. For example, there are fifteen pages on the Empire of Japan and only eleven pages on England.

The process of making the common objects of every-day use is as interesting as it is mysterious. We present the manufacturing process of over two hundred of the principal articles of commerce, and show the process from the time the raw material goes into the mill, factory, or workshop, until it comes out a finished product.

The articles on the states of the American Union have been compiled from information received from the various states and from matter obtained from the National Bureau of Statistics. Towns in the United States, of five thousand inhabitants or over, are given, with railroad connections of same.

We desire to acknowledge the valuable assistance rendered by those who have been engaged in the compilation of the work. Their signed and unsigned articles appear throughout the volumes.

While the reading-matter on a great many subjects has been very much abridged, we have made up for the deficiency in a most admirable way, in that there are over one thousand engravings in the books, ten per cent. of which are full-page engravings.

If diligent research and almost constant reference to a comprehensive library embracing works on art, science, law, and history, can avail anything, the accuracy of the work is not to be doubted.

> L. BRENT VAUGHAN, *Editor*.

Chicago, September, 1897.



#### Aalborg

A, the first letter in almost all alphabets. Most modern languages, as French, Italian, German, have only one sound for a, namely, the sound which is heard in *father* pronounced short or long; in English this letter is made to represent seven sounds, as in the words *father*, *mat*, *mate*, *mare*, *many*, *ball*, *what*, besides being used in such digraphs as *ea* in *heat*, *oa* in *boat*. A, in music, is the sixth note in the diatonic scale of C, and stands when in perfect tune to the latter note in the ratio of § to 1. The second string of the violin is tuned to this note.

A 1, a symbol attached to vessels of the highest class in Lloyd's register of shipping, A referring to the hull of the vessel, while 1 intimates the sufficiency of the rigging and whole equipment. Iron vessels are classed A 1 with a numeral prefixed, as 100 A 1, 90 A 1, the numeral denoting that they are built respectively according to certain specifications.

**Aalborg** (eel-town), a seaport of Denmark, with considerable trade, shipbuilding, fishing, etc. It is the capital of a province of the same name. Pop. 20,000.

Aali Pasha (1815-1871), a distinguished Turkish states man, b. at Constantinople. At the early age of fifteen he became a clerk in the foreign office, and rose steadily from one diplomatic post to another, at home, Vienna, and elsewhere, till in 1844 he became ambassador at London. This varied experience left on his acute mind a profound impression of the absolute necessity of extensive reforms in the government of the Ottoman Empire; and with these reforms, under the sultans Abdul Medjid and Abdul Aziz, the name of Aali Pasha is identified. He presided at the Commission which passed the famous reforming decree of 1856, the Hatti-Humayun. At the Congress of Paris he represented the porte, and maintained its cause with zeal and skill. He was grand-vizier more than once; and from 1861 till his death, held alternately with the likeminded Fuad Pasha the most influential posts in the Turkish service. He was active in suppressing the Cretan rebellion in 1867-68, and in repressing Egyptian efforts to shake off the supremacy of the porte.

Aard-vark (Duich "earth hog") (or Cape Ant-eater), one of the Edentata, and the only ant-eater with teeth. It has seven molars on each side above, and six on each side below; with neither incisors nor canine teeth. It is a stout animal, with long, pig-like snout, tubular mouth, the usual termite-catching tongue, large ears, fieshy tail, and short, bristly hair. The limbs are short and very muscular; on the fore feet are four, on the hind five powerful claws, used in burrowing and in excavating the hills of the white ants on which it feeds. It is nocturnal in its habits, and is very inoffensive and timid. When pursued, it can

#### Abbotsford

burrow itself out of sight in a few minutes, working inward with such rapidity as to make it almost impossible to dig it out. Its total length is about five feet, of which the tail is 1 ft. 9 in. Its dwelling is a burrow at a little distance from the surface, and thence it may be observed creeping at dusk. Three species are known—one in South Africa, another in Senegal, and a third in South Nubia. The flesh is considered a delicacy.

Aard-wolf ("earth-wolf") (Proteles Lalandii), a South African carnivore, belonging to a sub-family of Hyænidæ. It is fox-like in size and habit, but has longer ears and a less bushy tail. It resembles a hyena in its sloping back, in its color, markings, and dorsal mane, but has five toes on the fore feet, and the head is much more pointed and civet-like. The back teeth are small and simple, and there is no carnassial or special cutting-tooth. The strong, blunt claws are, as usual, non-retractile. It feeds on carrion, white ants, larva, etc., but not on living vertebrates. It is timid and nocturnal in its habits, social but quarrelsome in its life, and tolerably swift in its pace, though usually trusting rather to burrowing than to flight. Like the hyenas, the aardwolves habitually fight among themselves.

**Abancay**, a town of Peru, in the department of Cuzco. Sugar, hemp, and silver mining are the principal industries. Pop. 21,000.

Abattoir (slaughterhouse), in general use since the establishment of the celebrated abattoirs of Paris, instituted by Napoleon in 1807, and brought to completion in 1818. The immense packing houses of Chicago, Cincinnati, Kansas City, St. Joseph, and other American cities, represent the largest and best equipped abattoirs in the world. See Packing.

Abbey, CLEVELAND (1838-1896), American astronomer and meteorologist; educated in New York and at Ann Arbor; served four years on the U. S. coast survey, studied in Russia, was made director of the Cincinnati Observatory, and in 1871 organized the present weather bureau. The general accuracy of his meteorological predictions obtained for him the familiar name of "Old Probabilities."

Abbot, EZRA (1819–1884), studied at Phillips Exeter academy, graduated at Bowdoin 1840, and in 1850 became assistant librarian at Harvard. He was LL.D. (Yale, 1869). He left his main library of 5,000 volumes to Harvard, the remainder to the Divinity School of the University. His works include New Discussions of the Trinity, Literature of the Doctrine of a Future Life, and The Authorship of the Fourth Gospel.

**Ab' botsford**, the former country seat of Sir Walter Scott, on the south bank of the Tweed, in Roxburghshire, Scotland, in the midst of picturesque scenery, forming an extensive and irregular pile in the Scottish baronial style of architecture.

Ab'bott, JACOB (1803-1879), a popular and prolific American writer, especially of entertaining and instructive books for the young; was teacher and subsequently clergyman.

Abbott, JOHN S. C. (1805-1877), author, was a Congregational minister in Massachusetts. Among the historical works written by him are The History of Napoleon Bonaparte, Napoleon at St. Helena, The History of Napoleon III, and a History of the Civil War in America. He was a brother of the above.

Abbott, LYMAN (1835-), clergyman, born in Massachusetts, son of Jacob Abbott, graduated at the university of New York in 1853, and was admitted to the bar in 1856. He took up theology and was ordained in the Congregational Church in 1860. For five years he preached in Terre Haute, Ind. He became pastor of the New England church in New York City, but resigned in 1869. He edited the "Literary Record" of *Harper's Magazine*, and the *Illus*trated Christian Weekly. He was associated with the Rev. Henry Ward Beecher on the Christian Union, and afterward became the editor in chief. Mr. Abbott has written a Life of Henry Ward Beecher (1883), and has edited Beecher's sermons. In 1889 he became pastor of Plymouth church. Brooklyn, so many years identified with Mr. Beecher's labors.

Abd-el-Ka-der (1807-1883), a famous Arab chief, of a lofty, intrepid, and tenacious char-He distinguished himself by his deteracter. mined resistance to the French arms in N. Africa. The Turkish power being broken by the French conquest of Algiers (1829), the Arab tribes of Oran made A. their emir, and he was soon at the head of 10,000 cavalry. Two battles, 1833 and 1834, obliged General Desmichels to conclude a treaty with him, and his power was acknowledged in Oran and Titeri. In 1835 he was strong enough to inflict a signal defeat on Gen. Tretzel. But the French gradually obtained the mastery, and in December, 1847, he had himself to surrender. Abd-el-Kader was sent to Toulon, and was liberated by Louis Napoleon in 1852.

Abdica'tion, properly the voluntary, but sometimes also the involuntary resignation of an office or dignity, and more especially that of sovereign power. The more important ab-dications of the present century are: --

Charles Emmanuel IV of So	rdini	a, June 4, 1802.
Charles IV of Spain,		March 19, 1808.
Joseph Bonaparte of Naple	s	June 6, 1808.
Gustavus IV of Sweden, .	•	March 29, 1809.
Louis Bonaparte of Holland	d	July 2, 1810.
Nanoloon of Franco		( Apřil 14, 1814,
Napoleon of France	•	i June 22, 1815.
Victor Emmanuel of Sardir	nia.	March 13, 1821.
Charles X of France,		August 2, 1830.
William I of Holland, .		October 7, 1840.
Louis Philippe of France		<ul> <li>February 24, 1848.</li> </ul>
Ferdinand of Austria.		December 2, 1848.
Charles Albert of Sardinia.		March 23, 1849.
Isabella II of Spain.		June 25, 1870.
Amadeus I of Spain.		February 11, 1873.
Abdul Aziz of Turkey.		May 30, 1876.

Abdo'men, in man, the belly, or lower cavity of the trunk, separated from the upper cavity or thorax by the diaphragm and bounded below by the bones of the pelvis. It contains the viscera belonging to the digestive and urinary systems. See Anatomy.

Ab'dul-Az'iz, thirty-second Sultan of Turkey, brother to Abdul-Medjid, whom he succeeded in June, 1861. He concluded treaties of commerce with France and England, both of which countries he visited in 1867. Deposed in May, 1876, he committed suicide, or more probably was assassinated, in June, the same year. He was succeeded by his son Murad V.

Ab'dul-Ham'id, thirty-fourth Sultan of Turkey, younger son of Abdul-Medjid, born in 1842, succeeded his brother Murad V, who was deposed on proof of his insanity in 1876. He was a Turk, a Mussulman of the old school, and opposed to European interference. His reign was marked by massacres of Christians in Armenia, and by many internal disturbances

Ab'dul-Medj'id, thirty-first Sultan of Turkey (1822-1861). He succeeded his father, Mahmud II in 1839. Abdul-Medjid was desirous of carrying out reforms, but most of them remained inoperative, or caused bloody insurrections where attempts were made to carry them out. His reign was marked by the Crimean war, and his resolute conduct in refusing to surrender the refugee Kossuth.

à Becket, THOMAS, born in London 1117 or 1119, assassinated in Canterbury Cathedral Dec. 29, 1170. He was educated at Oxford and Paris and studied civil law at Bologna in Italy, and on his return made Archdeacon of Canterbury and Provost of Beverly. In 1158 Henry II appointed him high-chancellor and preceptor to his son, Prince Henry. At this period he was a complete courtier, conforming in every respect to the humor of the king. He was the king's prime companion, and courted popular applause. In 1162 he was consecrated archbishop, and appeared as a zealous champion of the church against the aggressions of the king, whose policy was to have the clergy in subordination to the civil power. He was forced to assent to the "Constitutions of Clarendon," but a series of bitter conflicts with the king followed, ending in a Becket's flight to France, when he appealed to the pope by whom he was supported. A reconciliation took place in 1170, and Becket returned to England, resumed his office, and renewed his defiance of the royal authority. A rash hint from the king induced four barons, Reginald Fitz-Urse, William de Tracy, Hugh de Morville, and Richard Breto, to go to Canterbury and murder the archbishop while at vespers in the cathedral. He was canonized in 1172, and the splendid shrine erected at Canterbury for his remains was a

favorite place of pilgrimage. Abel, KARL FRIEDRICH (1726-1787), a noted German musician, famous also as a performer on the viola de gamba.

Abel, NIELS HENRIK (1802-1829), a famous

Norwegian mathematician. Abelard, PIERRE (1079-1142), an illustrious French scholastic philosopher and theologian. He went to Paris at the age of twenty, and

became first a disciple and soon after a rival of Guillaume de Champeaux. A. next established himself as a philosophical lecturer in 1113, at Paris, where he obtained the chair of his former master. At this moment his reputation was immense. From Rome, England, and Germany, students hastened to listen to his eloquent logic. Poet and musician, as well as philosopher, he wrote songs in French for his students. He secretly married Heloïse, the beautiful niece of Fulbert, canon of Notre Dame, who in revenge put an end to their union. A council held at Soissons in 1121 condemned his opinions on the Trinity as heretical, and soon after he withdrew to Nogent-on-the-Seine, where he built an oratory, and named it the Paraclete, or Comforter. In 1140 the pope condemned him as a heretic to perpetual silence. Two years after (1142)  $\Lambda$ . died in the abbey of St. Marcel, near Chal-A. had a great respect for ons-sur-Marne. the human intellect. He was a superb dialectician, and the most brilliant orator of the schools in his own age.

Abencerrages (ab-en-ser'a-jez), a distinguished Moorish family of Granada, the chief members of which, thirty-six in number, are said to have been massacred in the Alhambra by the king Abu-Hassan (latter half of the fifteenth century) on account of the attachment of his sister to one of them.

Ab'en Ezra (1000-1168), a celebrated Jewish rabbi. He particularly distinguished himself as a commentator on Scripture.

Abercromble, JAMES (1706-1781), British soldier. He commanded the British forces in America in 1758, and was defeated at Ticonderoga and superseded the next year. His son James was killed at Bunker Hill.

**Aberdare** (dar'), a town of South Wales, in Glamorganshire, with extensive coal and iron mines in the vicinity. Pop. 38,513.

Aberdeen', a royal burgh of Scotland, in the county of the same name. It is one of the oldest towns in Scotland. The shipping trade is extensive. Among the industries are woolen, cotton, jute, and linen factories; large comb works, soap and candle works, provision-curing works, chemical-works, papership-building yards, and establishworks. ments for preparing granite for all sorts of useful and ornamental work. Pop. 126,000. The county of Aberdeen forms the northeastern portion of Scotland. Area, 1,251,451 acres. It is generally hilly, there being in the southwest some of the highest mountains in Scot-land, as Ben Macdhui (4,205 feet), Cairntoul (4,245). Cairngorm (4,090), Lochnagar, etc. Its most valuable mineral is granite, large quantities of which are exported. Cereals (except wheat) and other crops succeed well. On the banks of the upper Dee is situated Balmoral, a favorite residence of Queen Victoria. Pop. 281.331. The University of Aberdeen was formed by the union and incorporation, in 1860, by Act of Parliament, of the University and King's College of Aberdeen, founded in Old Aberdeen, in 1494, by William Elphinstone, Bishop of Aberdeen, under the authority of a Papal bull obtained by James IV, and of the Marischal College and University of Aberdeen, founded in New Aberdeen, in 1593, by George Keith, Earl Marischal, by a charter ratified by Act of Parliament. The library numbers over 80,000 volumes.

Aberdeen, Earls of, a noble family of Scotland, notable for two of its members: (1) George Hamilton Gordon, 4th earl (1784-1860), "the traveled thane, Athenian Aberdeen" of Robert Burns's eulogy. His management of the Crimean war provoked much dissatisfaction. (2) John Campbell Hamilton Gordon, 7th earl. b. 1847. In 1876 he forsook the conservative party and cast his lot with W. E. Gladstone. who, in 1886, appointed him Lord Lieutenant of Ireland. In May, 1893, he was appointed governor-general of Canada, where he is now very popular. His wife, Lady Aberdeen, took a prominent part at the World's Columbian Exposition in Chicago.

**Aberdeen**, Brown co., S. Dak., 300 mi. w. of Minneapolis. Railroads, C. M. & St. P.; C. & N. W., and Great Northern. Industries, large flouring-mill. Surrounding country agricultural. The town was first settled in 1880, and became a city in 1882. Pop. estimated, 1897, 4,500.

Abernethy, JOHN (1764-1831). He was an eminent English surgeon, a pupil of the celebrated John Hunter. In 1787 he became assistant surgeon to St. Bartholomew's hospital, and lecturer on anatomy and surgery. In 1815 he was elected principal surgeon. He published several medical works.

Aberra'tion, in astronomy, the difference between the true and the observed position of a heavenly body, the result of the combined effect of the motion of light and the motion of the eye of the observer caused by the annual or diurnal motion of the earth; or of the motion of light and that of the body from which the light proceeds. It was discovered by Dr. Bradley.

Aberystwith (ab-er-ist'with), a seaport and fashionable watering-place of Wales, county of Cardigan.

Abigail, the beautiful wife of Nabal, the rich churl of Carmel (I Samuel 25), and afterward wife of David. From her speech to David the name, in modern days, has been applied generally to a female servant.

Abilene, Dickenson co., Kan., near Smoky Hill River, 163 miles from Kansas City. Railroads, U. P., C. R. I. & P., and A. T. & S. F. Industries, two cotton-mills, three flouringmills, cigar factory, carriage shops, etc. Surrounding country agricultural and large dairy interests. The town was first settled in 1860, became a city in 1880. From 1867 to 1873 it was the northern end of the Texas cattle trail. Pop. estimated, 1897, 3,600.

Abingdon, Va., noted as a tobacco market and as the scene of important operations in the Civil War. Pop. 3,500.

Abington, a town of Massachusetts, 20 miles s. e. of Boston. It has manufactures of boots, shoes, and nails. Pop. 4,500.

Abiogenesis (a-bi-o-jen'e-sis), the doctrine

#### Abkasia

or hypothesis that living matter may be produced from non-living; spontaneous generation.

Abka'sia, a Russian district, at the western extremity and south of the Caucasus, between the mountains and the Black Sea. The Abkasians form a race distinguished from their neighbors in various respects. At one time they were Christians, but latterly adopted Mohammedanism. Pop. about 200,000.

**Abo** (ö'bö), a port in Russian Finland, the capital of Finland till 1819, when it was supplanted by Helsingfors. Pop. 23,000.

Abolitionists, a name given to the people who opposed slavery previous to the Civil War.

**Abo'mey**, the capital of the kingdom of Dahomey, in West Africa, in a fertile plain, near the coast of Guinea. Pop. 30,000.

**Aboukir** (à-bö-kēr') (ancient *Canopus*), a small village on the Egyptian coast, 10 miles east of Alexandria. In Aboukir Bay took place the naval battle in which Nelson annihilated a French fleet in 1798, thus totally destroying the naval power of France in the Mediterranean. Near this place on July 25, 1799, Napoleon defeated the Turks under Mustapha.

**About** (å-bö), EDMOND FRANÇOIS VALENTIN (1828-1885), a French novelist. He wrote in a bright, humorous, and interesting style, and his novels have been very popular.

Abracadabra, a meaningless word once supposed to have a magical efficacy as an antidote against agues and fevers.

A'braham, originally Abram, the greatest of the Hebrew patriarchs, was born at Ur in Chaldea in 2153 B.C. according to Hales, in 1996 B.C. according to Ussher, while Bunsen says he lived 2850 B.C. His two sons, Isaac and Ishmael, were the progenitors of the Hebrews and Arabs respectively.

**Abran'tes**, a fortified town of Portugal, 73 miles n. e. of Lisbon, with which it carries on an active trade. Pop. 6,076.

Abruzzi, a division of Italy comprising three provinces. The interior is rugged and mountainous, being traversed throughout by the Apennines. The lower parts consist of fertile plains and valleys, yielding corn, wine. oil, almonds. saffron, etc.; area, 6,677 sq. mi.; pop. 1,386,817.

**Absalom**, the third son of David, king of Israel. His rebellion, death, and David's touching lamentation for his son, are to be found in 2 Samuel.

Ab'sinth, French absinthe, a liquor consisting of an alcoholic solution strongly flavored with an extract of several sorts of wormwood, oil of anise, etc. When taken habitually, or in excess, its effects are very pernicious. It is a favorite drink of the Parisians.

Absolution, remission of a penitent's sins in the name of God. The passages of Scripture on which the Roman Catholic Church founds in laying down its doctrine of absolution are such as Matt. 16:19; 18:18; John 20:23.

Absorb'ents, the system of minute vessels by which the nutritive elements of food and

#### Abyssinia

other matters are carried into the circulation of vertebrate animals. The vessels consist of two different sets, called respectively *lacteals* and *lymphatics*.

**Absorp'tion**, in physiology, one of the vital functions by which the materials of nutrition and growth are absorbed and conveyed to the organs of plants and animals.

**Abu-Bekr**, or FATHER OF THE VIRGIN, the father-in-law and first successor of Mohammed. His right to the succession was unsuccessfully contested by Ali, Mohammed's son-in-law, and a schism took place, which divided the Mohammedans into the two great sects of Sunnites and Shiites.

**Abu Klea**, a group of wells, surrounded by mountains, about 120 miles from Khartoum, in the Soudan.

**Abu'tilon**, a troublesome weed in the Middle U. S.; has been recommended for cultivation. and is called American jute, and sometimes Indian mallows.

Aby'dos, (1) an ancient city of Asia Minor. on the Hellespont, at the narrowest part of the strait, opposite Sestos. Leander, say ancient writers, swam nightly from Abydos to Sestos to see his loved Hero — a feat in swimming accomplished also by Lord Byron. (2) an ancient city of Upper Egypt, about 6 miles west of the Nile, now represented only by ruins of temples, tombs, etc. It was celebrated as the burying-place of the god Osiris. Here, in 1818, was discovered the famous Abydos Tablet, containing a list of the predecessors of Rameses the Great.

**Abyssin'ia**, a country of Eastern Africa; area, about 120,000 sq. mi.; chief divisions Tigré, Amhara, and Shoa: principal towns, Gondar and Debra Tabor. The more marked



Abyssinian – Galla boy.

physical features are a vast series of tablelands, and numerous ranges of mountains. These rise to 12,000 and 13,000 feet, while some of the peaks are always covered with snow. The principal rivers belong to the Nile basin. According to elevation there are several zones of vegetation. Within the lowest belt, which reaches an elevation of 4,800 feet, cotton, wild indigo, acacias, ebony, baobabs, sugar-canes,



coffee-trees, date-palms, etc., flourish, while the larger animals are lions, panthers, elephants, rhinoceroses, hippopotamuses, jackals, hyenas, bears, numerous antelopes, monkeys, and crocodiles. The middle zone, rising to 9,000 feet, produces the grains, grasses, and fruits of southern Europe, the orange, vine, peach, apricot, the bamboo, sycamore-tree, etc. The principal grains are millet, barley, wheat, maize, and teff, the latter a small seed, a favorite bread-stuff of the Abyssinians. Two, and in some places three, crops are obtained in one year. All the domestic animals of Europe, except swine, are known. The highest zone, reaching to 14,000 feet, has but little wood, and generally scanty vegetation, the hardier corn-plants only being grown; but oxen, goats and long-wooled sheep find abundant pasture. The climate is as various as the surface; but as a whole is temperate and agreeable. The chief mineral products are sulphur, iron, copper, coal, and salt, the latter serving to some extent as money. There has been a great intermixture of races in Abyssinia. What may be considered the Abyssinians proper, seem to have a blood-relationship with the Bedouin Arabs. They belong to the Semitic race. The complexion varies from very dark through different shades of brown and copper to olive. The figure is usually symmetrical. Other races are the black Gallas from the south; the Falashas, who claim descent from Abraham, and retain many Jewish characteristics : the Agows, Gongas, etc. The great majority of the people profess Christianity, but their religion consists chiefly in the performance of empty ceremonies, and gross superstition as well as ignorance prevails. The chief spoken language is the Amharic. Mohammedanism appears to be gaining ground in Abyssinia, and in respect of morality the Moslems stand higher than the Christians. A corrupt form of Judaism is professed by the Falashas. The bulk of the people are devoted to agriculture and cattle-breeding. The trade and manufac-tures are of small importance. The Abyssinians were converted to Christianity in the fourth century, by some missionaries from Alexandria. Ethiopia, as the country was then called, saw its golden age in the sixth century. Since that period it has been har-assed by Arab invasions and disturbed by internal revolutions. An attempt to revive the power of the ancient kingdom was commenced about the middle of the present cen-tury by King Theodore. He introduced European artisans, but his tyranny counteracted his politic measures. In consequence of the imprisonment of Consul Cameron and a number of other British subjects, in 1863, an army of nearly 12,000 men was despatched from Bombay in 1867. The force came within sight of the hill-fortress of Magdala in April, After being defeated in a battle Theo-1868. dore delivered up the captives and shut himself up in Magdala, which was taken by storm on April 13, Theodore being found among the slain. Then internal dissensions

#### Academy

ended in the accession of Johannes, who was succeeded by Menelik, king of Shoa, who claims descent from Solomon and the Queen of Sheba. Egyptian encroachments and Italian attempts at colonization engaged his troops. In 1885 the Italians occupied Massowah and in 1889 established a protectorate over Abyssinia. The warlike inhabitants kept the invaders on the coast until 1806 when on the inception of an Italian policy of conquest the Abyssinians inflicted some severe defeats on their opponents. Pop. 5,000,000.

Acacla, a genus of plants, consisting of trees or shrubs with compound pinnate leaves



and small leaflets, growing in Africa, Arabia, the East Indies, Australia, etc. The flowers are arranged in spikes or globular heads at the axils of the leaves near the extremity of the branches. The corolla is bell-shaped; stamens are numerous; the fruit is a dry unjointed pod. Several of the species yield gum-arabic and other gums; some have astringent barks and pods, used in tanning. An Indian species yields the valuable astringent called catechu; the wattle-tree of Australia, from 15 to 30 feet in height, is the most beautiful and useful of the species found there. Its bark contains a large percentage of tannin, and is hence exported. Some species yield valuable timber; some are cultivated for the beauty of their flowers.

Acad'emy, an association for the promotion of literature, science, or art : established sometimes by government, sometimes by the voluntary union of private individuals. The name Academy was first applied to the philosophical school of Plato, from the place where he used to teach, a grove or garden at Athens which was said to have belonged originally to the hero Acadõmus. The American Philosophical Society, the oldest scientific institution in America, was organized in 1744, in Philadelphia. The Academy of Natural Sciences of Philadelphia was organized in 1812. The American Academy of Arts and Sciences, incorporated in 1780, is located at Boston, as also the Society of Natural History. The Connecticut Academy of Arts and Sciences was organized at New Haven in 1709. The New York Academy of Sciences was incorporated as the Lyceum of Natural History in 1818. The Peabody Academy of Sciences, Salem, Mass., was endowed by George Peabody in 1867. The Smithsonian Institu-tion, Washington, D. C., was founded by James Smithson, an English scientist, incorporated by Congress in 1846. Its publications have given it prominent standing among scientists. In the great West there are active Academies in Cincinnati, St. Louis, Chicago, Davenport, San Francisco, Cal., and New Orleans, The most celebrated institutions bearing the name of academies, and designed for the encouragement of science, antiquities, and language respectively, are the French Académie des Sciences (founded by Colbert in 1666), Académie des Inscriptions (founded by Colbert in 1663), and Académie Française (founded by Richelieu in 1635), all of which are now merged in the National Institute. The oldest of the academies instituted for the improvement of language is the Italian Accademia della Crusca (now the Florentine Academy), formed in 1582, and celebrated for the compilation of a dictionary of the Italian language, and for the publication of several editions of ancient Italian poets. In Britain the name of academy is confined almost exclusively to institutions for the promotion of the fine arts, such as the Royal Academy of Arts and the Royal Scottish Academy.

Ac'adia, the name formerly given to Nova Scotia. It received its first colonists from France in 1604, being then a possession of that country, but it passed to Britain, by the Peace of Utrecht, in 1713. In 1756, 18,000 of the French inhabitants were forcibly removed from their homes by the British, an incident on which is based Longfellow's Evangeline.

Acan'thus, a genus of plants or shrubs, mostly tropical, two species of which are characterized by large white flowers and



Acanthus natural.

Acanthus of Corinthian Capital.

They are deeply indented shining leaves. favorite ornamental plants in gardens. In architecture the name is given to a kind of foliage decoration, and much employed in Roman and later styles.

Acapul'co, a seaport of Mexico, on the Pacific, with a capacious, well-sheltered harbor; a coaling station for steamers, but with no great trade. Pop. 5,000.

Acarna'nia, the most westerly portion of Northern Greece, pop. 138.444. The Acarnanians of ancient times were behind the other Greeks in civilization, living by robbery and piracy.

Acclimatiza'tion, the process of accustoming plants or animals to live and propagate in a climate different from that to which they are indigenous, or the change which the constitution of an animal or plant undergoes under new climatic conditions, in the direction of adaptation to those conditions. The systematic study of acclimatization has only been entered upon in very recent times, and the little progress that has been made in it has been more in the direction of formulating anticipative, if not arbitrary hypotheses, than of actual discovery and acquisition of facts. The term is sometimes applied to the case of animals or plants taking readily to a new country with a climate and other circumstances similar to what they have left, such as European animals and plants in America and New Zealand: but this is more properly naturalization than acclimatization.

Accor'dion, a keyed musical wind-instru-ment similar to the concertina; being in the form of a small box, containing a number of metallio reeds fixed at one of their extremities, the sides of the box forming a folding apparatus which acts as a bellows to supply the wind, and thus set the reeds in vibration, and produce the notes both of melody and harmony.

Ac'crah, a British settlement in Africa, on the Gold Coast, about 75 miles east of Cape Coast Castle. Exports gold-dust, ivory, gums, palm-oil; imports cottons, cutlery, firearms, etc.

Ac'crington, a town of England, Lancashire, 5 miles east of Blackburn, with large cotton factories, print-works, and bleach-fields, and coal-mines adjacent. Pop. 38,603.

Accu'mulator, a name applied to a kind of electric battery by means of which electric energy can be stored and rendered portable. In the usual form each battery forms a cylindrical leaden vessel, containing alternate sheets of metallic lead and minium wrapped in felt and rolled into a spiral wetted with acidulated water. On being charged with electricity the energy may be preserved till required for use. See *Electricity*.

Acetates, salts of acetic acid. The acetates of most commercial or manufacturing importance are those of aluminium and iron, which are used in calico-printing; of copper, which as verdigris is used as a color; and of lead, best known as sugar of lead. The acetates of potassium, sodium, and ammonium, of iron, zinc, and lead, and the acetate of morphia, are employed in medicine.

Acet'ic Acid, an acid produced by the oxidation of common alcohol, and of many other organic substances. Pure acetic acid has a very sour taste and pungent smell, burns the skin, and is poisonous. From freezing at ordinary temperatures  $(58^\circ \text{ or } 59^\circ)$  it is known as glacial acetic acid. Vinegar is simply dilute acetic acid, and is prepared by subjecting wine or weak spirits to the action of the air; also from malt which has undergone vinous fermentation. Acetic acid, both concentrated and dilute, is largely used in the arts, in medicine, and for domestic purposes. See Vinegar.

Acetylene, a pure hydro-carbon gas. It is clear, colorless, and heavy; has a distinct odor; burns with a flame of intense brilliancy. It is present in ordinary illuminating gas only to the extent of from 1/2 to 11/2 per cent. The

gas is poisonous to the same extent as ordinary gas, but its characteristic odor gives warning if there is any leak. There is no odor from the gas while burning, the flame being clear, white, and steady, without smoke, and with little heat. Acetylene gas is produced, com-mercially, by the action of water on *calcic* carbide, and the calcic carbide is the result of electrical fusion of coal dust and lime in the proportion of 1,130 pounds of coal dust to 1,750 pounds of lime. The resultant is 2,000 pounds of calcic carbide. The coal dust and lime, ground together, and intimately but mechanically associated, is placed in an electric furnace. The intense heat fuses the materials, and produces a dark, gray, cinder-like sub-stance called *calcium curbide*, or calcic car-bide. The calcic carbide can be exposed to the most intense heat of a blast furnace without perceptible effect. The atmosphere does not act upon the calcic carbide to any appreciable extent, although exposure to the air, particularly if the air is moist, reduces the gas-producing power. The instant water is brought in contact with the carbide, acetylene gas is produced. A double decomposition takes place. The oxygen of water unites with the calcium of the calcic carbide, forming oxide of calcium, which falls to the bottom of the generator. The hydrogen of the water unites with the carbon of the calcic carbide, forming the acetylene, which rises and is used.

For many years acetylene gas was known as a laboratory product too expensive for any-thing but experimental use. A possible method of producing this gas on a commercial basis was developed in the electric furnaces of the Willson Aluminium Company, Spray, N. C., by T. L. Willson while experimenting with the production of *aluminium*, and the smelting of refractory substances under the direction of Major J. T. Morehead, president of the company, and a geologist of national reputation. In the course of the experiments, coke and lime were fused together in the electric furnace, and the resulting products were thrown in a bucket of water. The violent bubbling, caused by the gas, directed attention to it; a match was struck, and the gas burst into a clear flame. The development of the experiments resulted in large electric furnaces being built at Niagara Falls, and calcio or calcium carbide is now a commercial product. Portable generators for house use are made, and the carbide is sold directly to consumers, who thus make their own illuminating gas.

Achievans (à-kê'anz), one of the four main divisions of the ancient Greeks. They migrated from Thessaly to the Peloponnesus, which they ruled in the heroic period. From very early times a confederacy existed among the twelve towns of this region. After the death of Alexander the Great it was broken up, but was revived again, B. c. 280, and from this time grew in power till it spread over the whole Peloponnesus. It was finally dissolved by the Romans, B. c. 147, and after this the whole of Greece, except Thessaly, was called Achaia or Achæa. Achaia with Elis now forms a monarchy of the kingdom of Greece. Pop. 181,632.

Achard (åk'årt), FRANZ KARL (1753-1821), a German chemist, principally known by his invention (1789-1800) of a process for manufacturing sugar from beet-root.

Achates (a-kā'tēz), a companion of Æneas in his wanderings subsequent to his flight from Troy. He is always distinguished in Vergil's Æneid by the epithet fidus, "faithful," and has become typical of a faithful friend and companion.

Acheen, or Atchin (å-chēn'), a native state of Sumatra, with capital of same name, in the n. w. extremity of the island, now nominally under Dutch administration. Though largely mountainous, it has also undulating tracts and low fertile plains. By treaty with Britain the Dutch were prevented from extending their territory in Sumatra by conquest; but this obstacle being removed, in 1871 they proceeded to occupy Acheen. It was not till 1879, however, that they obtained a general recogni-tion of their authority. They were forced to evacuate part of the Acheenese territory in 1885. In the seventeenth century Acheen was a powerful state, and carried on hostilities successfully against the Portuguese, but its influence decreased with the increase of the Dutch power. The principal exports are rice and pepper. Area 19,000 sq. mi.; pop. 600,000.

Achelous (ak-e-lo'-us), now Aspropotomo, the largest river of Greece, rising on Mount Pindus, separating Ætolia and Acarnania, and falling into the Ionian Sea. Achelous was the rivergod of Greece.

Acheron (ak' e-ron), the ancient name of several rivers in Greece and Italy, all of which were connected by legend with the lower world.

Achill (ak' il), or Eagle Island, the largest island on the Irish coast. Area, 51,521 acres, mostly bog. The chief occupation of the 5,000 inhabitants is fishing.

Achilles (a-kil' ēz), a Greek legendary hero, the chief character in Homer's Iliad. He was the son of Peleus, and of the Nereid Thetis, was instructed in eloquence and the arts of war by Phoenix, and in medicine by the centaur Cheiron. He led the Myrmidons to Troy in fifty ships, and was there the great bulwark of the Greeks. Being deprived by Agamemnon of Brisels, he ceased to take further part in the war, and the fortunes of the Greeks became desperate. He reconciled himself to Agamemnon, attacked the Trojans, and slew their bravest warrior, Hector. A legend represents his mother as having dipped him in the Styx to render him invulnerable, in which she succeeded with the exception of the ankles, by which she held him.

Achilles' Tendon, Tendon of Achilles, the strong tendon which connects the muscles of the calf with the heel, and may be easily felt with the hand. The origin of name is from the myth of Achilles' immersion in the river Styx.

Acid (Latin, acidus, sour), a name popularly

applied to a number of compounds. solid, liquid, and gaseous, having more or less the qualities of vinegar (itself a diluted form of acetic acid), the general properties assigned to them being a tart, sour taste, the power of changing vegetable blues into reds, of decomposing chalk and marble with effervescence, and of being in various degrees neutralized by alkalies. An acid has been defined as a substance containing hydrogen, which hydrogen is in whole or in part replaceable by a metal when the metal is presented in the form of a hydrate; being monobasic, diebasic, or tribasic, according to the number of hydrogen atoms replaced.

Acierage ( $\tilde{a}'$  se-  $\tilde{e}r$ - $\tilde{a}j$ ), a process by which an engraved copper-plate or an electrotype from an engraved plate of steel or copper has a film of iron deposited over its surface by electricity in order to protect the engraving from wear in printing. By this means an electrotype of a fine engraving, which, if printed directly from the copper, would not yield 500 good impressions, can be made to yield 3,000 or more; and when the film of iron becomes so worn as to reveal any part of the copper, it may be removed and a fresh coating deposited so that 20,000 good impressions may be got.

Aci Reale ( $\ddot{a}$ 'che-rā- $\ddot{a}$ 'lā), a seaport of Sicily, with a trade in corn, wine, fruit, etc. Pop. 24,100.

Aclin'ic Line, the magnetic equator, an irregular curve in the neighborhood of the terrestrial equator, where the magnetic needle balances itself horizontally, having no dip.

Aconcagua (à-kon-kä'gwà), a province, a river, and a mountain of Chile. The peak of Aconcagua, rising to the height of 22,860 feet, is one of the highest summits of the western hemisphere. Area of prov., 6,224 sq. mi. Pop. 133,830. Capital, San Felipe.

Ac'onite, a genus of hardy herbaceous

repreplants, sented by the well-known wolf's-bane or monk's-hood. and remarkable for their poisonous properties and medicinal qualities, being used internally as well as externally in rheumatism, gout, neuralgia. Aconitine is an alkaloid extracted from aconite, a virulent poison.



Aconquija (å-kon-kë'hà), a range of mountains in the Argentine Republic; the name also of a single peak, 17,000 feet

high. Acotyle'dons, plants not furnished with cotyledons or seed-lobes. They include ferns, mosses, sea-weeds, etc., and are also called flowerless plants.

Acoustics (a-kou'stiks), the science of sound. It teaches the cause, nature, and phenomena of such vibrations of elastic bodies as affect the organ of hearing; the manner in which sound is produced, its transmission through air and other media, the doctrine of reflected sound or echoes, the properties and effects of different sounds, including musical sounds or notes, and the structure and action of the organ of hearing, etc. The propagation of sound is analogous to that of light, both being due to vibrations which produce successive waves, and Newton was the first to show that its propagation through any medium depended upon the elasticity of that medium. Regarding the intensity, reflection, and refraction of sound, much the same rules apply as in light. In ordinary cases of hearing, the vibrating medium is air, but all substances capable of vibrating may be employed to propagate and convey sound. When a bell is struck its vibrations are communicated to the particles of air surrounding it, and from these to particles outside them, until they reach the ear of the listener. The intensity of sound varies inversely as the square of the distance of the body sounding from the



ear. Sound travels through the air at the rate of about 1.090 feet per second; through water at the rate of about 4,700 feet. Sounds may be musical or non-musical. A musical sound is caused by a regular series of exactly similar pulses succeeding each other at precisely equal intervals of time. If these conditions are not fulfilled the sound is a noise. Musical sounds are comparatively simple, and are combined to give pleasing sensations according to easy numerical relations. The loudness of a note depends upon the *degree* to which it affects the ear; the *pitch* of a note depends on the *number* of vibrations to the second which produce the note; the timbre, quality, or character of a note depends on the body or bodies whose vibrations produce the sound, and is due to the form of the paths of vibrating particles. The gamut is a series of eight notes, which are called by the names Do, Re, Mi, Fa, Sol, La, Si, Do. The properties of sound were mathematically investigated by Bacon and Galileo, but it remained for Newton, Lagrange, Euler, Laplace, Helmholtz, etc., to bring the science to its present state.

Acre, a standard measure of land, used in the U.S. and England. The acre consists of 4,840 square yards, divided into 4 roods.

**Acre** ( $\mathbf{\hat{a}}'$  ker), a seaport of Syria, in northern Palestine, on the Bay of Acre, early a place of



great strength and importance. Taken from the Saracens under Saladin in 1191 by Richard I of England and Philip of France; bravely defended by the Turks assisted by Sir Sidney Smith in 1799 against Napoleon; in 1832, taken by Ibrahim Pasha; in 1840, bombarded by a British, Austrian, and Turkish fleet, and restored to the sultan of Turkey. Pop. 10,000.

**Ácrop'olis**, the citadel or chief place of a Grecian city, usually on an eminence commanding the town. That of Athens contained some of the finest buildings in the world, such as the Parthenon, Erechthěum, etc.

Acros'tic, a poem of which the first or last, or certain other letters of the line, taken in order, form some name, motto, or sentence. A poem of which both first and last letters are thus arranged is called a double acrostic. In Hebrew poetry, the term is given to a poem, of which the initial letters of the lines or stanzas were made to run over the letters of the alphabet in their order, as in Psalm 119. Acrostics have been much used in complimentary verses, the initial letters giving the name of the person eulogized.

Acte on, in Greek mythology, a great hunter, turned into a stag by Artemis (Diana) for looking on her when she was bathing, and torn to pieces by his own dogs.

Ac'tinism, the property of those rays of light which produce chemical changes, as in photography, in contradistinction to the light rays and heat rays. The actinic property or force begins among the green rays, is strongest in the violet rays, and extends a long way beyond the visible spectrum.

Actinozo'a, a class of animals including seaanemones, corals, etc., all having rayed tentacles round the mouth.

Action, the mode of seeking redress at law for any wrong, injury, or deprivation. Actions are divided into civil and criminal, the former again being divided into real, personal, and mixed.

Ac'tium, a promontory on the western coast of Northern Greece, memorable on account of the naval victory gained here by Octavianus (afterward the Emperor Augustus) over Antony and Cleopatra, Sept. 2, B. c. 31. Cleopatra fled with sixty Egyptian ships, and Antony fled with her to Egypt. The deserted fleet was overcome after a brave resistance. Antony's land forces went over to the enemy.

Acts of the Apostles, one of the books of the New Testament, written in Greek by St. Luke. probably in A. D. 63 or 64. It embraces a period of about thirty years, beginning immediately after the Resurrection, and extending to the second year of the imprisonment of St. Paul in Rome.

Acupress'ure, a means of arresting bleeding from a cut artery introduced by Sir James Simpson in 1859, and consisting in compressing the artery above the orifice, that is, on the side nearest the heart, with the middle of a needle introduced through the tissues.

Acupunc'ture, a surgical operation, consisting in the insertion of needles into certain parts of the body for alleviating pain, or for the cure of different species of rheumatism, neuralgia, eye diseases, etc. It is easily performed, gives little pain, causes neither bleeding nor inflammation, and seems at times of surprising efficacy.

Adal', a country in Africa, east of Abyssinia, inhabited by a dark-brown race of same name, of nomadic habits, Mohammedans in religion; towns Aussa and Tajurrah. Part of the coast here is held by the French.

Ad'albert of Prague (955-997), called "the apostle of the Prussians," son of a Bohemian nobleman, appointed bishop of Prague in 983, labored in vain among the heathenish Bohemians, resolved to convert the pagans of Prussia, but was murdered in the attempt.

Adam, ROBERT (1728-1792), an eminent Scottish architect. He was employed by the English nobility and gentry in constructing modern and embellishing ancient mansions. Among his works are the Register House and the University buildings, Edinburgh, the royal Infirmary, Glasgow, and the Adelphi Buildings, London. He was buried in Westminster Abbey.

Adam and Eve, the names given in Scripture to our first parents, an account of whom and their immediate descendants is given in the early chapters of Genesis.

Adam de la Hale (1240-1287), French writer and musician. His *Jeu de Robin et de Marion* may be regarded as the first comic opera ever written.

Adama'wa, a region of Central Africa, also called *Fumbina*. Much of the surface is hilly or mountainous. A great part of the country is covered with thick forests. The inhabitants are industrious and intelligent. Slaves and ivory are the chief articles of trade. Chief town, Yola.

Chief town, Yola. Adams, Berks co., Mass., a prosperous manufacturing village 20 miles from Pittsfield. Pop. 9,206.

Ad'ams, CHARLES FRANCIS (1807-1886), American author and statesman, son of John Quincy Adams. His youthful years were spent in Europe, partly in England, but he finished his education at Harvard, and afterward studied law. After serving some years in the Massachusetts legislature was elected to Congress in 1858. In 1861 he was sent to England as American minister, and here he remained for seven years, performing the arduous duties of his office with the utmost tact and ability. He has edited a complete edition of his grandfather's works in ten volumes, with a life. He was one of the arbitrators on the Alabama claims.

Adams, CHARLES FRANCIS, Jr., second son of the above, born in Boston, 1835, graduated at Harvard, 1856, and admitted to the bar, 1858. He served in the Union army 1861–1865. He was appointed on the board of railroad commissioners for Massachusetts, 1869, and in 1884 president of the Union Pacific railway. He published *Chapters of Erie and other Essans*.

Adams, Charles Kendall, b. 1835 at Derby,



Vt. He graduated at the University of Michigan in 1861. He was made assistant professor there in 1863 and full professor in 1868. He became non-resident professor of history at ('ornell University in 1881, and in 1885 succeeded Andrew D. White as president. He is the author of *Democracy and Monarchy in France* (1874), and of *A Manual of Historical Literature* (N. Y. 1882). He became president of the University of Wisconsin in 1892.

Adams, GEORGE EVERETT, b. 1840 at Keene, N. H., graduated at Harvard, 1860. He moved to Chicago and practised law; elected state senator in 1880; elected to Congress from the fourth district in 1882 and re-elected three times. He is a Republican.

Adams, HENRY, b. 1838. was professor of history at Harvard 1870–1877. He has written several historical works. The youngest son of Charles Francis Adams.

Adams, JOHN (1735-1826), second president of the U. S., was born at Braintree (now Quincy), Massachusetts. He was educated at Harvard University, and adopted the law as a profession. His attention was directed to politics by the question as to the right of the English Parliament to tax the colonies, and in 1765 he published some essays strongly opposed to the claims of the mother country. As a member of the new American Congress in 1774, 1775, and 1776, he was strenuous in his opposition to the home government, and in organizing the various departments of the colonial government. On 13th May, 1776, he seconded the motion for a declaration of independence proposed by Lee of Virginia, and was appointed a member of committee to draw it up. The declaration was actually drawn up by Jefferson, but it was Adams who carried it through Congress. In 1778 he went to France on a special mission, but soon came back and again returned, and for nine years resided abroad as representative of his country in France, Holland, and England. After taking part in the peace negotiations he was appointed, in 1785, the first ambassador of the U.S. to the court of St. James. He was recalled in 1788, and in the same year elected vice-president of the republic under Washington. In 1792 he was re-elected vicepresident, and at the following election in 1796 was chosen president in succession to Washington. The commonwealth was then divided into two parties, the federalists, who favored aristocratic, and were suspected of monarchic views, and the republicans or democrats. Adams adhered to the former party, with which his views of government had always been in accordance, but the real leader of the party was Hamilton, with whom Adams did not agree, and who tried to prevent his election. His term of office proved a stormy one, which broke up and dissolved the federalist party. His re-election in 1800 was again opposed by the efforts of Hamilton, which ended in effecting the return of the democratic candidate Jefferson. Thus Adams retired from office into the obscurity of private life.

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He had the consolation of living to see his son president. He died 4th July, 1826, the fiftieth anniversary of the declaration of independence, and on the same day as Jefferson. His works have been ably edited by his grandson Charles Francis Adams.

Adams, JOHN COUCH (1819–1892), an English astronomer. His investigations into the irregularities in the motion of the planet Uranus led him to the conclusion that they must be caused by another more distant planet. The French astronomer, Leverrier, had come to substantially the same results, which, being published in 1846, led to the actual discovery of the planet Neptune by Galle of Berlin. In 1858 Adams was professor of astronomy and geometry at Cambridge.

Adams, JOHN QUINCY (1767-1848), sixth president of the U. S., son of John Adams, second president. He accompanied his father to Europe and was educated there in part, but graduated at Harvard in 1788. He was ad-mitted to the bar in 1791. He began to take an active interest in politics, and some letters that he wrote having attracted general attention, in 1794 Washington appointed him minister to the Hague. He afterward was sent to Portugal, and by his father to Berlin. In 1798 he received a commission to negotiate a treaty of commerce with Sweden. On the accession of Jefferson to the presidency in 1801 he was recalled. The federalist party (that of his father), which was now declining, had sufficient influence in Massachusetts to elect him to the senate in 1803. In 1809 he went as ambassador to Russia. He assisted in nego-tiating the peace of 1814 with England, and was afterward appointed resident minister at London. Under Monroe as president he was secretary of state, and at the expiration of Monroe's double term of office he succeeded him in the presidency (1825). He was not very successful as president, and at the end of his term (1829) he was not re-elected. In 1831 he was returned to Congress by Massachusetts, and continued to represent this state till his death, his efforts being now chiefly on behalf of the abolitionist party.

Adams, JOHN QUINCY, b. 1833, was a member of the Massachusetts legislature, and contested the gubernatorial chair in 1867 and 1871. The oldest son of Charles Francis Adams.

Adams, SAMTEL (1722-1803), an American statesman, second cousin of President John Adams. He early devoted himself to politics, and in connection with the dispute between America and the mother country he showed himself one of the most unwearied, efficient, and disinterested assertors of American freedom and independence. He was one of the signers of the declaration of 1776, which he labored most indefatigably to bring forward. He sat in Congress eight years, in 1789-94 was lieutenant-governor of Massachusetts, in 1704-97 governor, when he retired from public life.

Adams, WILLIAM T. (1822-1897), born in Medway, Mass., better known by his pseudonym "Oliver Optic." a popular writer of

books for boys, was of the same family as the two presidents. Of his 36 volumes over half a million copies have been sold.

Adam's Bridge, a chain of reefs, sandbanks, and islands stretching between India and Ceylon; so called because the Mohammedans believe that when Adam was driven from paradise he had to pass by this way to Ceylon (where is also Adam's Peak).

Adam's Peak, one of the highest mountains in Ceylon 45 mi. e. s. e. of Colombo, conical, isolated, and 7,420 feet high. On the top, a rocky area of 64 ft. by 45, is a hollow in the rock 5 feet long bearing a rude resemblance to a human foot, which the Brahmans believe to be the footprint of Siva, the Buddhists that of Buddha, the Mohammedans that of Adam. Devotees of all creeds here meet and present their offerings (chiefly rhododendron flowers) to the sacred footprint. The ascent is very steep, and toward the summit is assisted by steps cut and iron chains riveted in the rock.

Ad'dax, a species of antelope of the size of a large ass with much of its make. The horns of the male are about 4 feet long, beautifully twisted into a wide sweeping spiral of two turns and a half, with the points directed outward. It has tufts of hair on the forehead and throat, and large broad hoofs. It inhabits the sandy regions of Nubia and Kordofan, and is also found in Caffraria.

Add'ison, JOSEPH (1672-1719), the most exquisite of English essayists, the founder of periodical literature, and poet, was the son of Rev. L. Addison, Dean of Lichfield, and was born at Milston, in Wiltshire. As a boy he made the acquaintance of Steele, afterward his coadjutor on the Tattler and Spectator. He graduated from Oxford M. A. in 1693. He traveled in Italy for two years, returning to England in 1703. While in Italy he penned his poetical Letter to Lord Halifax. In 1704 he wrote The Campaign, a poem addressed to the Duke of Marlborough, became member of Parliament in 1708, and in 1717 he was appointed secretary of state. He died at Holland House. A. commenced to write for the Tattler in 1709, and for its successor, the Spectator, in 1711. His tragedy of Cato, produced in 1713, met with unbounded success. Of his poetry one or two sacred pieces will endure as long as the language; but success. it is as an essayist that he is best known. For humor and poetic grace; for satire and for moral influence the essays of the Spectator remain unsurpassed.

Address, Forms of. The following are the principal modes of formally addressing titled personages or persons holding official rank in Great Britain and the U.S.:-

The King or Queen. - Address in writing : To the King's (Queen's) most excellent Majesty.

Say: Sire or Madam, Your Majesty. *The Royal Family.*— His Royal Highness (H. R. H.) the Prince of Wales, His Royal Highness the Duke of C—, His Royal Highness Prince A-

Duke and Ducal Family.-His Grace the Duke of ----; My Lord Duke, Your Grace. The duke's eldest son takes a secondary title

of his father, and is addressed as if he held it by right. A younger son is addressed, The Right Honorable Lord J-B-.

Marquis.— The Most Honorable the Marquis of ——, My Lord Marquis, My Lord. Earl.— The Right Honorable Earl of ——; My Lord, Your Lordship. The Right Honor-able the Countess of ——; Madam, Your Ladyship

Viscount.- The Right Honorable Lord Viscount ——; My Lord, Your Lordship. The Right Honorable the Viscountess ——; Madam,

Your Ladyship. Baron.— The Right Honorable Lord —; My Lord, Your Lordship.

Knight.—Sir C— D –, Kt., or K. G., K. C. B., G. C. B., etc., according to rank. The wives R. G. Č. B., etc., according to rank. of baronets and knights are styled Lady

Archbishop .- His Grace the Lord Archbishop of -

—; My Lord Archbishop; Your Grace. Bishop.— The Right Rev. the Lord Bishop of -; My Lord. Dean.-The Very Reverend; Sir; Mr. Dean.

Members of the Privy Council, the Speaker of the House of Commons, the Lord Chancel-

lor, Lord Advocate, are called Right Honorable ; members of Parliament, Honorable.

The Lord Mayors of London, York, and Dublin are styled Right Honorable.

In the U.S. persons holding official rank are similarly addressed; thus the President is styled His Excellency, as are also governors of states and foreign ministers; the vice-president, lieutenant-governors, senators, representatives, judges, and mayors are styled Honorable.

Adelaide (ad'e-lād), the capital of South Australia, founded in 1837, and named after the queen of William IV. The public buildings comprise the government house, court houses, the houses of legislature, the University, South Australian Institute, etc. Adelaide is connected by railway with Melbourne, and is the terminus of the overland telegraph to Port Darwin. Pop. 46,550.

Adelung (ad'e-lung), JOHANN CHRISTOPH (1732-1806), a German philologist. In 1759 he was appointed professor in the Protestant academy at Erfurt, and two years after removed to Leipzig, where he applied himself to his German dictionary (Leipzig, 1774-86), and his Mithridates, a work on general philology. In 1787 he was appointed librarian of the public library in Dresden.— FRIEDRICH VON ADELUNG (1768-1843), nephew of the above, also distinguished himself as a philologist. He became president of the Academy of Sciences at St. Petersburg.

A'den, a seaport town and territory on the southwest coast of Arabia. Occupying an important military position, Aden is strongly fortified and permanently garrisoned. Pop. 35,165.

Adenanthe'ra, a genus of trees and shrubs, natives of the East Indies and Ceylon. It includes one of the largest and handsomest trees of India, which yields hard solid timber called red sandal-wood. The bright scarlet seeds,

#### Adhesion

from their equality in weight (each-4 grains), are used by goldsmiths in the East as weights,

Adhesion, the tendency of two bodies to stick together when put in close contact, or the mutual attraction of their surfaces; distinguished from cohesion, which denotes the mutual attraction between the particles of a homogeneous body. Adhesion may exist between two solids, between a solid and a fluid, or between two fluids. A plate of glass or of polished metal laid on the surface of water and attached to one arm of a balance will support much more than its own weight in the opposite scale from the force of adhesion between the water and the plate. From the same force arises the tendency of most liquids, when gently poured from a jar, to run down the exterior of a vessel or along any other surface they meet.

Adige (ä'dē-jā), (German, Etsch), a river of Northern Italy, which rises in the Rhætian Alps, and after a south and east course of about 180 miles, during which it passes Verona and Legnago, falls into the Adriatic, forming a delta connected with that of the Po.

Adiron'dack flountains, a group belonging to the Appalachian chain, extending from the n. e. corner of the state of New York to near its center. The scenery is wild and grand, diversified by numerous beautiful lakes, and the whole region is a favorite resort of sportsmen and tourists. The district has been preserved in its natural beauty by state legislation constituting it a public park.

Adjutant-bird, a large wading bird of the stork family, native of the warmer parts of India. It stands about five feet high, has an enormous bill, and a pouch hanging from the

under part of the neck. It is one of the most voracious carnivorous birds known, and in India, from its devouring all sorts of carrion a n d noxious animals, is protected by law. From underneath the wings obtained a r e those light downy feathers known as marabou feathers. from the name of an allied species of bird Western in Africa, and also producing them.



Adjutant-bird.

Adler, FELIX, b. 1851, in Germany. He graduated at Columbia college in 1870, and studied at Berlin and Heidelberg. He was Professor of Hebrew and Oriental literature at Cornell 1874-76, and is at the head of the Society of Ethical Culture, New York City.

Adme'tus, in Greek mythology, king of Pheræ, in Thessaly, and husband of Alcestis, who gave signal proof of her attachment by consenting to die in order to prolong her husband's life.

Admiralty Charts. These useful aids to navigation are issued by the U. S. Coast Survey, as well as by the English, Russian, and French governments. The superintendent of the U. S. Coast Survey issues an annual report, showing the progress of the survey, and containing much valuable information.

Admiralty Island, an island belonging to the U. S. off the n. w. coast of N. A., 80 or 90 miles long and about 20 broad, covered with fine timber and inhabited by Sitka Indians.

Admiralty Islands, a cluster of islands, north of New Guinea, belonging to Germany. The largest is about 60 miles in length. They possess dense groves of cocoa-nut trees. The islanders are of a tawny color, have no metal (except what is imported), but use tools of stone and shell.

Adobe (å-dö'bā), the Spanish name for a brick made of loamy earth, containing about two thirds fine sand and one third clay dust, sun dried; in common use for building in Mexico, Texas, and Central America.

Ado'ni, a town and district in Madras, India; population of former 22,732, of latter 179,-448. Well known for excellent silk and cotton fabrics.

Ado'nis, a mythological personage, originally a deity of the Phænicians, but borrowed into Greek mythology. See Mythology.

into Greek mythology. See Mythology. Ado'nis, a genus of plants. In the cornadonis or pheasant's eye the petals are bright scarlet like the blood of Adonis, from which the plant is fabled to have sprung.

Adour (å-dör), a river of France, rising in the Pyrenees, and falling into the sea a little below Bayonne; length about 200 miles; partly navigable.

Ado'wa, a town of Abyssinia in Tigrć, at an elevation of 6,270 feet; the chief commercial depôt on the caravan route from Massowa to Gondar. Pop. about 6,000.

Adra (ä' dra), a seaport of southern Spain, in Andalusia, near the mouth of the Adra, on the Mediterranean; with marble quarries and lead works. Pop. 11,320.

Adrar', a district in the western Sahara of Africa, peopled by Berbers possessing camels, sheep, and oxen, and cul-



Berber Woman.

tivating dates, wheat, barley, and melons. Chief towns, Wadan, and Shingit, which has inexhaustible beds of rocksalt.

Adria (ä'dri-å), a cathedral city of northern Italy, province of Rovigo, between the Po and the Adige, on the site of the ancient town of same name, whence the Adriatic derives its appellation. Owing to alluvial deposits, the sea is now 17 miles distant. Pop. 11,554.

Adrian, the name of six popes of Rome. The first ruled from 772-795; a contemporary and friend of Charlemagne.-ADRIAN II was elected pope in 867, at the age of seventy-five years. He died in 872, in the midst of con-flicts with the Greek Church.—Adrian III, elected 884, was pope for one year and four months only.—ADRIAN IV, originally named Nicolas Breakspear, the only Englishman that ever occupied the papal chair, was born about 1100, and died 1159. He studied in France, and became abbot of St. Rufus in Provence. He became pope in 1154. He issued the famous bull (1158) granting the sovereignty of Ireland, on condition of the payment of Peter's pence, to Henry II.—ADRIAN V, settled the dispute between King Henry III, of England and his nobles, in favor of the former; but died a month after his election to the papal chair (1276).—ADRIAN VI, born at Utrecht, in 1459, was elected to the papal chair, 1522. He opposed the zeal of Luther with reproaches and threats, and even attempted to excite Erasmus and Zwinglius against him. Died 1523.

A'drian, Lenawee co., Mich., 70 miles w. s. w. of Detroit. Its extensive water-power is employed in works of various kinds. Pop. 10,000.

Adriano'ple, an important city of Turkey, about 135 miles w. n. w. from Constantinople. It has a great mosque, a palace, now in a state of decay, a grand aqueduct, and a splendid bazar: manufacturers of silk, woolen, and cotton stuffs, otto of roses, leather, etc., and an important trade. Adrianople was the residence of the Turkish sovereigns till the conquest of Constantinople in 1453. In 1829 it was taken by the Russians. The Russians occupied it also in 1878. Pop. 60,000.

Adriat'ic Sea, or GULF OF VENICE, an arm of the Mediterranean, stretching in a northwesterly direction from the Straits of Otranto, between Italy and the Turkish and Austrian dominions. Length. about 480 miles; average breadth. about 100; area, about 60,000 \$4. mi.

Adul'lam, CAVE OF, a cave to which David fled when persecuted by Saul. 1 Sam. 22:1, 2.

Adultera'tion, a term not only applied in its proper sense to the fraudulent mixture of articles of commerce, food, drink, drugs, seeds, etc., with noxious or inferior ingredients, but also by magistrates and analysts to accidental impurity, and even in some cases to actual substitution. The chief objects of adulteration are to increase the weight or volume of the article, to give a color which either makes a good article more pleasing to the eye or else disguises

an inferior one, to substitute a cheaper form of the article, or the same substance from which the strength has been extracted, or to give it a false strength. Among the adulterations which are practised for the purpose of fraudulently increasing the weight or volume of an article are the following:-Bread is adulterated with alum or sulphate of copper which gives solidity to the gluten of inferior flour; with chalk or carbonate of soda to correct the acidity of such flour; and with boiled rice or potatoes, which enables the bread to carry more water, and thus to produce a larger number of loaves from a given quantity of flour. Milk is usually adul-terated with water. The adulterations generally present in butter consist of an undue proportion of salt and water, lard, tallow, and other fats. Genuine butter should not con-tain less than 80 per cent. of butter-fat. Tea is adulterated (chiefly in China) with sand, iron-filings, chalk, gypsum, China clay, exhausted tea leaves, and the leaves of the sycamore, while color and weight are added by black-lead, indigo, Prussian-blue, gum, turmeric, soapstone, and other substances. Coffee is mingled with chicory, roasted wheat, roasted beans, acorns, rye-flour, and colored with burned sugar, and other materials. Chicory is adulterated with different flours, as rye, wheat, beans, etc., and colored with burned sugar, Venetian red, etc.

Tobacco is mixed with sugar and treacle, aloes, liquorice, oil, alum, etc., and such leaves as rhubarb, chicory, cabbage, burdock, besides excess of salt and water. Confections are adulterated with flour and sulphate of lime. Pepper is adulterated with linseed-meal, flour, mustard husks, etc. Color is given to pickles by salts of copper, acetate of copper, etc. Brandy is diluted with water, and burned sugar is added to improve the color. Gin is mixed with excess of water, and flavoring matters are added. For champagne, gooseberry and other inferior wines are often substituted. Medicines, such as jalap, opium, rhubarb, aloes, sarsaparilla, squills, etc., are mixed with various foreign substances. Castor-oil has been adulterated with other oils; and inferior oils are often mixed with codliver oil. The adulteration of seeds is largely practised. Thus turnip-seed is mixed with rape, wild mustard, or charlock. Clover is also much mixed with plantain and mere weeds. Laws against adulteration have been passed in various countries and at various times.

**Ægean Sea** ( $\tilde{e}$ - $j\tilde{e}$ 'an), that part of the Mediterranean which washes the eastern shores of Greece, the southern coast of Turkey, and the western coast of Asia Minor.

**Aggina** (e-ji'na), a Greek island; area about 32 sq. mi.; pop. 7,000. Except in the west, where the surface is more level, the island is mountainous and unproductive. The inhabitants are chiefly engaged in trade, seafaring, and agriculture, the chief crops being almonds, olives, and grain. In 456 B.c. the island fell under the power of the Athenians, and in

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431 the Æginetans were expelled to make room for Athenian settlers, but were afterward restored. On a hill are the remains of a splendid temple of Athena (Minerva). Here were found in 1811 a number of marble statues (the Æginetan marbles), which are now at Munich.

Ægis (ë' jis), the shield of Zeus, according to Homer. In a figurative sense the word is used to denote some shielding or protecting power.

to denote some shielding or protecting power. **Ægospot'ami** ("goat-river"), a place on the Hellespont, of some note in Greek history, the Athenian fleet being here completely defeated in 405 B. c. by the Spartan Lysander, thus ending the Peloponnesian war.

Æne'as, the hero of Vergil's Ænëid, a Trojan, who, according to Homer, was, next to Hector, the bravest of the warriors of Troy. See Vergil.

**Abolian Harp**, a musical instrument, generally consisting of a box of thin fibrous wood, to which are attached from eight to fifteen fine catgut strings or wires, stretched on low bridges at each end, and tuned in unison. Its length is made to correspond with the size of the window or other aperture in which it is intended to be placed. When the wind blows athwart the strings, it produces very beautiful sounds, sweetly mingling all the harmonic tones, and swelling or diminishing according to the strength or weakness of the blast. It is said to have been invented by the German Jesuit, Athanasius Kerches (1602-1680).

**Æ'olus**, in Greek mythology the god of the winds, which he kept confined in a cave in the Æolian Islands, releasing them when he wished or was commanded by the superior gods.

Æpyor'nis, a genus of gigantic birds whose remains have been found in Madagascar, where it is supposed to have lived perhaps not longer than 200 years ago. It had three toes, and is classed with the ostrich, etc. Its eggs measured 14 inches in length, being about six times the bulk of those of the ostrich.

the bulk of those of the ostrich. A'erated Bread. — The raising of bread in baking is accomplished in two distinct ways. By the fermentation process carbonic acid gas is generated in the dough by induced alcoholic fermentation, but when the carbonic acid is developed from a foreign substance or introduced from without, acrated or unfermented bread is the result. The principal method of bread is the result. manufacturing A. B. is by a process patented by the late Dr. Danglish. It consists in making dough with water charged with carbonic acid under high pressure, which renders the mass uniformly spongiform throughout. The water for mixing is charged with carbonic acid in the same manner plain Aërated Water is prepared, and the mixing is accomplished in a strong cast-iron cylinder, in which a series of arms revolves by steam-power. The dough is expelled from the lower end of the cylinder into a box which is gauged to hold a two-pound loaf, and from the box it is removed into pans for firing without any portion of the material ever being handled.

A'erated Waters, waters impregnated with

carbonic acid gas, and forming effervescing beverages. Some mineral waters are naturally aërated, as Vichy, Apollinaris, Rosbach, etc.; others, especially such as are used for medicinal purposes, are frequently aërated to render them more palatable and exhilarating. Water simply aërated, or aërated and flavored with lemonade or fruit syrups, is largely used, especially in summer, as a refreshing beverage.

A'erolite, a meteoric stone, meteorite, or shooting-star. See Meteor.

Aeronau'tics, the art of sailing in or navi-gating the air. The first form in which the idea of aërial locomotion naturally suggested itself was that of providing men with wings by which they should be enabled to fly. It is now, however, the general opinion of scientific men that it is impossible for man by his muscular strength alone to give motion to wings of sufficient extent to keep him sus-pended in the air. But although the muscles of man may be of insufficient strength to enable him to use such wings, there yet remains the possibility of making a flying car, elevated and propelled by machinery, or a boat to float in the air. The navigation of the air by means of the balloon dates only from nearly the close of the eighteenth century. In 1766 Henry Cavendish showed that hydrogen gas was at least seven times lighter than ordinary air, and it at once occurred to Dr. Black of Edinburgh that a thin bag filled with this gas would rise in the air, but his experiments were for some reason unsuccessful. Some years afterward Tiberius Cavallo found that a bladder was too heavy and paper too porous, but in 1782 he succeeded in elevating soapbubbles by inflating them with hydrogen gas. In this and the following year two French-men, the brothers Stephen and Joseph Montgolfier, acting on the observation of the suspension of clouds in the atmosphere and the ascent of smoke, were able to cause several bags to ascend by rarefying the air within them by means of a fire below. These experiments roused much attention at Paris; and soon after a balloon was constructed under the superintendence of Professor Charles, which being inflated with hydrogen gas rose over 3,000 feet in two minutes, disappeared in the clouds, and fell after three quarters of an hour about 15 miles from Paris. These Montgolfier and Charles balloons already represented the two distinct principles in respect to the source of elevating power, the one being inflated with common air rarefied by heat, requiring a fire to keep up the rarefaction, the other being filled with gas lighter at a common temperature than air, and thus rendered permanently buoyant. Both forms were used for a considerable time, but the greater safety and convenience of the gaseous inflation finally prevailed. After the use of coal-gas had been introduced it superseded hydrogen gas, as being much less expensive, though having a far less elevating power. The first person who made an ascent in a balloon was Pilâtre de Rozier, who ascended 50 feet at Paris in 1783 in one of Montgolfler's.

A short time afterward M. Charles and M. Robert ascended in a balloon inflated with hydrogen gas, and traveled a distance of 27 miles from the Tuileries; M. Charles by himself also ascended to a height of about 2 miles. Blanchard with the American Dr. Jeffries, first crossed the Channel from Dover to Calais, in 1785; Garnerin, who first descended by a parachute from a balloon in October, 1797; and Gay-Lussac, who reached the height of 23,000 feet in September, 1804. In 1836 a balloon carrying Messrs. Green, Holland, and Mason traversed the 500 miles between London and Weilburg in Nassau in eighteen hours. In 1859 Mr. J. Wise, the chief of American aëronauts, accompanied by several others, rose from New York, and landed, after a flight of 1.150 miles, in twenty hours. In September, 1862, the renowned acronaut, Mr. Glaisher, accompanied by Mr. Coxwell, made an ascent from Wolverhampton, and reached the elevation of 37,000 feet, or 7 miles, which far exceeds the height hitherto attained by any other aërial voyagers. But the daring excursionists were for a time in great peril, Mr. Glaisher having been insensible for seven minutes, and Mr. Coxwell having his hands so severely frozen that he was unable to pull the valve for descent with them, and was compelled to use his teeth.-All the features of the balloon as now used are more or less due to Professor Charles, already mentioned. The balloon is a large pear-shaped bag, made of pliable silk cloth, covered with a varnish of caoutchouc dissolved in oil of turpentine to render it air-tight. The ordinary size of the bag ranges from 20 to 30 feet in equatorial diameter, with a proportionate height, but a balloon of 100 feet in diameter and 130 feet in height has been constructed. A car, generally of wicker-work, supported by a network which extends over the balloon, contains the aëronaut, and a valve, usually placed at the top, to which is attached a string reaching the car, gives him the power of allowing the gas to escape, whereby the balloon is lowered at pleasure. The problem of how to steer or propel a balloon in a desired horizontal direction can scarcely be said to have been satis-factorily solved. Balloons of a fish or cigar shape, floated by gas, propelled by a screw driven by a dynamo-electric machine, and steered by a large rudder, made several ascents in Paris in 1884 and 1885, and it is claimed for them that they have settled the question of the practicability of aerial navigation. Balloons have been used for taking both meteorological and military observations with considerable success. During the siege of Paris in 1870-71 over sixty persons (including Gambetta) and innumerable letters left the city in balloons. Recent experiments have been directed to flying machines by Maxim, Chanut, and others, and to dirigible kites by Lieut. Wise of the U.S. army.

Acrostatic Press, a simple contrivance for rendering the pressure of the atmosphere available for extracting the coloring matter from dye-woods, and similar purposes. A horizontal partition divides the machine into two parts. The lower part is connected with an air-pump, by means of which the air can be withdrawn from it. The matter from which the substance is to be extracted is laid upon the partition, which is perforated, and a perforated cover is placed over it. Upon this the liquid intended to form the extract is poured, and, the pump being worked, the air is extracted from the lower vessel, and by the pressure of the atmosphere the liquid is forced through the intervening mass, carrying the color or other soluble matter with it.

color or other soluble matter with it. **Æschines** (ës'ki-nëz), (390-314 B. c.) a celebrated Athenian orator, the rival and opponent of Demosthenes. He headed the Macedonian party in Greece, or those in favor of an alliance with Philip, while Demosthenes took the opposite side. Having failed in B. c. 330 in a prosecution against Ctesiphon for proposing to bestow a crown of gold upon Demosthenes for his services to the state (whence the oration of Demosthenes On the Croacn) he withdrew from Athens. Latterly he established a school of eloquence at Rhodes.

Æschylus (524-456 B. C.), the earliest of the three great writers of Greek tragedy.— He was of noble family, and probably a de-scendant of Codrus, the last king of Athens. His father was probably connected with the worship of Ceres, and Æschylus himself was early familiar with the Eleusinian Mysteries, strange religious rites into which he was after-Æschylus's life was active, ward initiated. not only in the field of dramatic poetry, but on the battle-field in defence of Athens against the invaders. For distinguished valor at Marathon (490) he, with his two brothers, Exclusion (100) in the area of the area of the first of t gained the prize for a trilogy. In the latter part of his life he was defeated by Simonides in the contest for a prize offered for the best elegy on those who fell at Marathon. Æschylus spent most, and perhaps all, of his remaining years in Sicily, where he was well received, and died there. - Of Æschylus's 70 dramas but seven are preserved, in addition to a few Of these the Prometheus is fragments. perhaps the best known to English readers through Mrs. Browning's poetical version. Æschylus has given an original portrayal to the story, making Prometheus's awful fate appear as the just result of his wilful self-assertion. In the Agamemnon is beautifully told the story of Clytemnestra's crime. He caused the first stage to be erected, and was the first to provide appropriate scenery and costumes. In style, the tragedies of Æschylus are grand and somber, and in their intensity they sometimes surpass even Shakes-Like this poet Æschylus drew his peare. material largely from myths and legends. Some are historical in character. The Persæ tells of the defeat of Xerxes and his host.

**Ascula plus**, the god of medicine among the Greeks and latterly adopted by the Romans, usually said to have been a son of Apollo.

He is often represented with a large beard, holding a knotty staff, round which is entwined a serpent, the serpent being specially his symbol.

Æ'sop, the Greek fabulist, is said to have been a contemporary of Crœsus and Solon, and thus probably lived about the middle of the sixth century B. C. He visited the court of Crœsus, and is also said to have visited Pisistratus at Athens. Finally he was sent by Crœsus to Delphi to distribute a sum of money to each of the citizens. For some reason he refused to distribute the money, whereupon the Delphians, enraged, threw him from a precipice, and killed him. In modern times several collections purporting to be Æsop's fables have been published.

Æsthet'ics, the philosophy of the beautiful; the name given to the branch of philosophy or of science which is concerned with that class of emotions, or with those attributes, real or apparent, of objects generally comprehended under the term beauty, and other related expressions. Baumgarten (1714-1762), a German philosopher, was the first modern writer to treat systematically on the subject. Socrates, according to Xenophon, regarded the beautiful as coincident with the good, and both as resolvable into the useful. Plato, in accordance with his idealistic theory, held the existence of an absolute beauty, which is the ground of beauty in all things. He also asserted the intimate union of the good, the beautiful, and the true. In his treatises on Poetry and Rhetoric Aristotle lays down a theory of art, and establishes principles of beauty. His philosophical views were in many respects opposed to those of Plato. He does not admit an abso-lute conception of the beautiful; but he distinguishes beauty from the good, the useful, the fit, and the necessary. A distinction of beauty, according to him, is the absence of lust or desire in the pleasure it excites. Beauty has no utilitarian or ethical object; the aim of art is merely to give immediate pleasure; its essence is imitation. Plotinus agrees with Plato, and disagrees with Aristotle, in holding that beauty may subsist in single and simple objects, and consequently in restoring the ab-solute conception of beauty. He differs from Plato and Aristotle in raising art above nature. Baumgarten's treatment of æsthetics is essentially Platonic. He made the division of philosophy into logic, ethics, and æsthetics; the first dealing with knowledge, the second with action (will and desire), the third with beauty. He limits asthetics to the conceptions derived from the senses, and makes them consist in confused or obscured conceptions, in contradistinction to logical knowledge, which con-sists in clear conceptions. Kant defines beauty in reference to his four categories-quantity, quality, relation, and modality. In accordance with the subjective character of his system, he denies an absolute conception of beauty, but his detailed treatment of the subject is incon-sistent with the denial. Thus he attributes a beauty to single colors and tones, not on any plea of complexity, but on the ground of purity. He holds also that the highest meaning of beauty is to symbolize moral good, and arbitrarily attaches moral character to the seven primary colors. The value of art is mediate, and the beauty of art is inferior to that of nature. The treatment of beauty in the systems of Schelling and Hegel could with difficulty be made comprehensible without a detailed reference to the principles of these remarkable speculations. English writers on beauty are numerous, but they rarely ascend to the heights of German speculation. Shaftesbury adopted the notion that beauty is perceived by a special internal sense; in which he was followed by Hutcheson, who held that beauty existed only in the perceiving mind, and not in the Numerous English writers, among object. whom the principal are Alison and Jeffrey, have supported the theory that the source of beauty is to be found in association - a theory analogous to that which places morality in sympathy. Dugald Stewart attempted to show that there is no common quality in the beautiful beyond that of producing a certain refined pleasure; and Bain agrees with this criticism, but endeavors to restrict the beautiful within a group of emotions chiefly excited by association or combination of simpler elementary Herbert Spencer has a theory of feelings. beauty which is subservient to the theory of evolution. He makes beauty consist in the play of the higher powers of perception and emotion, defined as an activity not directly subservient to any processes conducive to life, but being gratifications sought for themselves alone. He classifies æsthetic pleasures according to the complexity of the emotions excited, or the number of powers duly exercised; and he attributes the depth and apparent vagueness of musical emotions to associations with vocal tones built up during vast ages. Among numerous writers who have made valuable contributions to the scientific discussion of esthetics may be mentioned Winckelmann, Lessing, Richter, the Schlegels, Gervinus, Helmholtz, and Ruskin.

Ætna, (or Etna) Mount, the greatest volcano in Europe, in the province of Catania in Sicily; height, 10,874 feet. It rises immediately from the sea, has a circumference of more than 100 miles, and dominates the whole northeast part of Sicily, having a number of towns on its lower slopes. The top is covered with perpetual snow; midway down is the woody or forest region; at the foot is a region of orchards, vineyards, olive groves, etc. Ætna thus presents the variety of climates common to high mountains in lower latitudes, oranges and lemons and other fruits growing at the foot, the vine rather higher up, then oaks, chestnuts, beeches, and pines, while on the loftiest or desert region vegetation is of quite a stunted character. A more or less distinct margin of cliff separates the mountain proper from the surrounding plain; and the whole mass seems formed of a series of superimposed mountains, the terminal volcano being surrounded by a number of cones, all of volcanic origin, and nearly 100 of which are of consid-

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The different aspects of the erable size. mountain present an astonishing variety of features - woods, forests, pastures, cultivated fields, bare rocky precipices, streams of lava, masses of ashes and scorize, as also picturesque towns and villages. From the summit the view presents a splendid panorama, embracing the whole of Sicily, the Lipari Islands, Malta, and Calabria. The eruptions of Ætna have been numerous, and many of them destructive. That of 1169 overwhelmed Catania and buried 15,000 persons in the ruins. In 1669 the lava spread over the country for forty days, and 10,000 persons are estimated to have perished. In 1693 there was an earthquake during the eruption, when over 60,000 lives were lost. One eruption was in 1755, the year of the Lisbon earthquake. Among more recent eruptions are those of 1832, 1865. 1874, 1879. An eruption is ordinarily preceded by premonitory symptoms of longer or shorter duration. The population of the dis-trict of Ætna is about 300,000.

**Æto'lia**, a western division of northern Greece. The inhabitants are little heard of in Greek history till the Peloponnesian war, at which time they were notorious among the Greeks for the rudeness of their manners.

Affida'vit, a written statement of facts upon oath or affirmation. Affidavits are generally made use of when evidence is to be laid before a judge or a court, while evidence brought before a jury is delivered orally. The person making the affidavit signs his name at the bottom of it, and swears that the statements contained in it are true. The affidavit may be sworn to in open court, or before a magistrate or other duly qualified person.

Affin'ity, in chemistry, the force by which unlike kinds of matter combine so intimately that the properties of the constituents are lost, and a compound with new properties is The usual effect of increase of produced. temperature is to diminish affinity and ultimately to cause the separation of a compound Where two elements into its constituents. combine to form a compound, heat is almost always evolved, and the amount evolved serves as a measure of the affinity. In order that chemical affinity may come into play it is necessary that the substances should be in contact, and usually one of them at least is a fluid or a gas. Color, taste, and smell are changed, destroyed, or created ; harmless constituents produce strong poisons; strong poisons produce harmless compounds.

Affin'ity, the relationship, imputed by reason of marriage, between the husband or wife and the kindred by blood of the other. Thus the wife's kindred bear the same relation by affinity to the husband that they bear to her by consanguinity. Affinity also exists between the husband and one who is connected by marriage with the blood relations of the wife, as in the case of two men who were married to sisters. It constitutes a disqualification of judges or jurors equally with consanguinity. In England, under the statute 32 Henry VIII, it was held that affinity was an impediment to marriage to the same extent as consanguinity; and hence arose the rule of the English law that a man may not marry his deceased wife's sister.

Afghanistan (äf-gän'i-stän), a country in Asia. In part the boundaries are not well defined, but recently that from the Oxus to the Persian frontier has been surveyed and marked by boundary stones by a joint Russian and British commission. The area may be set down at about 280,000 sq. mi. 'The population is estimated at between 5,000,000 and 6,000,-000. Afghanistan consists chiefly of lofty, bare, uninhabited tablelands, sandy, barren plains, ranges of snow-covered mountains, offsets of the Hindu Kush or the Himalayas, and deep ravines and valleys. Many of the last are well watered and very fertile, but about four fifths of the whole surface is rocky, mountain-ous, and unproductive. The surface on the northeast is covered with lofty ranges belonging to the Hindu Kush, whose heights are often 18,000 and sometimes reach perhaps 25,-000 feet. The northeastern portion of the country has a general elevation of over 6,000 feet; but toward the southwest, the gen-eral elevation declines to about 1,600 feet. The interior mountains reach the height of 15,000 feet. Great part of the frontier toward India consists of the Suleiman range, 12,000 feet high. There are numerous avenues of communication between Afghanistan and India, such as the Khyber Pass, the Gomul Pass, and the Bolan Pass, The largest river is the Helmund, 400 miles long. The climate is extremely cold in the higher, and intensely hot in the lower regions. The most common trees are pines, oaks, birch, and walnut. In the valleys fruits in the greatest variety and abun-dance, grow wild. The principal crops are wheat, barley, rice, maize, tobacco, sugar-cane, and cotton. The chief domestic animals are the dromedary, the horse, ass, and mule, the ox, sheep, and goat; of wild animals, there are the tiger, bears, leopards, wolves, jackal, hyena, foxes, etc. The chief towns are Cabul (the capital), Kandahar, Ghuzni, and Herat. The Afghans proper form the great mass of the people. They are allied in blood to the Persians, and are divided into a number of tribes, among which the Duranis and Ghiljis are the most important. The Afghans are bold, hardy, and warlike, of a restless, turbulent temper, and much given to plunder. Tribal dissensions are constantly in existence. Their language is distinct from the Persian, though it contains a great number of Persian words, and is written with the Arabic char-In religion they are Mohammedans acters. of the Sunnite sect.

The history of Afghanistan belongs almost to modern times. In 1738 the country was conquered by the Persians. About 1825 Dost Mohammed, the ruler of Cabul, acquired a preponderating influence in the country. In 1839, a British army entered Afghanistan, occupied Cabul, and placed Shah Shuja, a former ruler, on the throne. The Afghans organized a widespread insurrection in 1841, when a number of British officers, women, and children were murdered. In January, 1842, the British left Cabul. In a few months Gen. Pollock, with a fresh army from India, retook Cabul and soon finished the war. Shah Shuja having been assassinated, Dost Mohammed again obtained the throne of Cabul, and acquired extensive power in Afghanistan. He died in 1863, having nominated his son Shere Ali his successor. Shere Ali entered into friendly relations with the British, but in 1878 war was declared against him, and the British troops entered Afghanistan. The ameer fied to Turkestan, where he soon after died: and his son Yakeob Khan, having succeeded him, concluded a treaty with the British in 1879, in which extension of the British frontier, the control by Britain of the foreign policy, and the residence of a British envoy in Cabul, were the chief stipulations. In 1880 Abdur-Rahman, a grandson of Dost Mohammed, was recognized by Britain as emir of the country, and has since been on friendly terms with the British, by whom he is subsidized. Recent encroachments by the Russians on territory claimed by Afghanistan almost brought about a rupture between Britain and Russia in 1885, and has led to the delimitation of the frontier of Afghanistan on the side next the territory now occupied by Russia.

Af'rica, the second in size of the great divisions of the globe, lies in the eastern hemisphere. Its greatest length is about 5,000 miles, its greatest breadth 4,700, its area is 11,525,810 sq. mi., and its coast-line 15,000 miles. A. is shaped like an irregular triangle, having its vertex to the south, and is bounded n. by the Mediterranean, e. by the Red Sea and Indian Ocean, and w. by the Atlantic Ocean. It is joined to Asia by a narrow neck of land, which, however, has been cut through by the Suez Canal. There are few large gulfs and bays; the most important are the gulfs of Sidra and Kabes (the greater and lesser Syrtes) on the n.; Suez, Aden, and Delagoa Bay on the e.; Algoa Bay on the s.; and the Gulf of Guinea on the w. The principal capes are Bon on the n.; Guardafui on the e.; Good Hope on the s.; and Verd on the w. The islands belonging to Africa are not numerous, and except Madagascar, none of them are large. They include Madeira, the Canaries, large. They include Madeira, the Canaries, Cape Verd Islands, Fernando Po, Prince's Island, St. Thomas, Ascension, St. Helena, Mauritius, Bourbon, the Comoros, Socotra, etc.

Political Divisions.— The African continent has undergone considerable modification politically, during the last decade, due to wars and exploration and colonization. The principal political divisions of Africa are—Egypt, Algeria, Morocco, Tunis and Tripoli, Abyssinia, Congo Free State, Liberia, Sierra Leone. Cape of Good Hope, Natal, South African Republic (Transvaal), Orange Free State, Senegal, Rivieres du Sud, French Soudan, Algolia, Mossandes, Benguela, St. Paul de Loanda, Portuguese Congo, State of East Africa, Fritrea. Togoland, Kamarun, Rio de Oro, Ifni, Kordofan, Darfoor, Madagascar, Mauritius. About one fourth of Africa is under the direct or indirect control of seven European states — Great Britain, France, Portugal, Spain, Germany, Italy, and Turkey. The remainder of the continent consists of independent empires and kingdoms, republics and tribal states. Great Britain holds Gambia and Sierra Leone, a part of the Gumea coast, a part of the Lower Niger and Benue, the colonies of Cape and Natal, with Griqualand West, and has protectorates over Basutoland, Kafirland, Pondoland, part of Zululand, Bechuanaland, part of the territory between Mount Kilima Njoro and the Dana River, and Socotra; and also has military occupation of Egypt. France holds Algeria, Tunis, Senegal, the

France holds Algeria, Tunis, Senegal, the Gaboon and Ogoway basins, Obok and Grand Bassand.

Portugal holds Angolia and Benguela, with a small tract just north of the Congo mouth, Mozambique.

Spain holds Cuta, opposite Gibraltar, Ifni, and the District of Muni and Naya Rivers.

Germany has acquired the coast lands between Cape Frio and the Orange River, the Cameroons at the head of the Gulf of Guinea, and some territory in the region of Victoria Nyanza.

Italy occupies the Red Sea coast from Massowa to Assab.

Turkey continues her suzerainty over Egypt and retains the pashalik of Tripolitana with Fezzan.

Belgium, through King Leopold II, has the sovereignty of Congo Free State, which was founded by the International Conference of Berlin in 1885.

The most important native states are Morocco, the Abyssinian Empire, Waddai, Fulah, including the empire of Sococa and the kingdoms of Gando and Moasina on the Niger; Dahomey, Zanzibar, U-Ganda, U-Rua, U-Lunda, Matabele, the two Boer states of Transvaal (South African Republic), and Orange Free State. Liberia a native republic founded prior to the abolition of slavery in the U. S., as a home for emancipated slaves. Population, about 20,000 descendants of American negroes and about one million natives. Surface, Rivers, and Lakes.— The most strik-

ing feature of northern Africa is the immense tract known as the Sahara, or Great Desert, which is inclosed on the north by the Atlas Mountains (greatest height, 12,000 to 13,000 feet), the plateau of Barbary and that of Barca, on the east by the mountains along the west coast of the Red Sea, on the west by the Atlantic Ocean, and on the south by the Sou-The Sahara is by no means the sea of dan. sand it has sometimes been represented: it contains elevated plateaux and even mountains radiating in all directions, with habit-able valleys between. A considerable nomadic population is scattered over the habitable parts, and in the more favored regions there are settled communities. The Soudan, which lies to the south of the Sahara, and separates it from the more elevated plateau of Southern Africa, forms a belt of pastoral country across



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TYPES OF AFRICAN RACES. I. Ashanti. 2. Negress of Loango. 3. Kamerunian. 4. Baluban 10. Akka 11. Zuin. 12. Massai. 13. Wanganda (Ugandai). 14. Darfur-Negro. 15. Haussanian. 16-17. Bush



ornamental scars. 5. Somali, Eissa-Somali. 6. Abyssinian Woman. 7. Howa. 8. Herorian Woman. 9. Ovambo, Husband and Wife. 16. Namaqua. 19. Niamniam. 20. Dinka.



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Africa, and includes the countries on the Niger, around Lake Tchad (or Chad), and eastward to the elevated region of Abyssinia. Southern Africa as a whole is much more fertile and well watered than Northern Africa, though it also has a desert tract of considerable extent (the Kalahari Desert). The mountains which inclose Southern Africa are mostly much higher on the east than on the west, the most northerly of the former being those of Abyssinia, with heights of 10,000 to 14,000 or 16,000 feet, while the eastern edge of the Abyssinian plateau presents a steep un-broken line of 7,000 feet in height for many hundred miles. Farther south, and between the great lakes and the Indian Ocean, we find Mounts Kenia and Kilimanjaro (19,500 feet), the loftiest in Africa, covered with perpetual snow. Of the continuation of this mountain boundary we shall only mention the Drakenberg Mountains, which stretch to the southern extremity of the continent, reaching in Cathkin Peak, Natal, the height of over 10,000 feet. Of the mountains that form the western border the highest are the Cameroon Mountains, which rise to a height of 13,000 feet, at the inner angle of the Gulf of Guinea. The average elevation of the southern plateau is probably from 3,000 to 4,000 feet.

In respect to the river systems of Africa there is a certain symmetry. The two great southern basins of the Congo and Zambezi balance those of the Nile and Niger on the north, and the Orange and Limpopo in the extreme south correspond with the Senegal and Draa of the northwest. The Zambezi, Limpopo, Rovuma, Juba, and a few other coast streams flow into the Indian Ocean. The Congo, Nile, Niger, Orange, Cuncne, Koamza, Ogo-way, Volta, Cambaia, Tensife, Muluya, and Majerdah flow into the Atlantic directly or through the Mediterranean. Nearly all of these rivers have falls or rapids such as the Victoria Falls in the Zambezi, the Yellala and Isangulla and Stanley Falls on the Congo, the so-called six cataracts, the Ripon, the Mer-chison and others on the Nile, the Hundred Falls on the Middle Orange. The principal lakes of Africa are Nyassa, Tanganyika, Alex-andria Nyanza, Victoria Nyanza, Mwutan Nzige, Albert Nyanza, Victoria (next to Lake Superior the largest fresh water basin on the globe). In the equatorial lake region are Lake Psad, Ngani, Tana.

Geology.—In its geological constitution, Africa gives the appearance of great stability and antiquity. The seaboard is subject to scarcely any movements of upheaval or subsidence, except on the n. e. coast between the Nile delta and the Gulf of Sidra, and parts of the Moroccan and Red Sea coasts. Earthquakes are confined mainly to the Atlas, and igneous disturbances are restricted on the west side to the Bight of Biafra. On the east side, the volcanic system is much more highly developed, stretching from the Comoro Islands through Masai Land (Kilima-Njaro, Kenia, Elgon, etc.), northward to the Danákil country, and the volcanic islets in the Red Sea.

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The lava-fields of the Masai plateau present The old plutonic signs of recent activity. and recent eruptive rocks appear to be generally intermingled and largely associated with semi-crystalline and metamorphic forms, such as the schists, gneisses, graywackes, and hornblendes, about Kilima-Njaro and many other places. Shales and flaggy sandstones form the geological basis of the East African carboniferous series, which extends in a narrow strip from near the equator continuously to the Cape. Hard granite forms the bed of the Orange River, and asbestos, soapstone, coal, iron, and copper were among the speci-mens collected by Farini in the Kalahari steppe. Metamorphic rocks, again, prevail in the Congo basin, where iron and copper ores also abound. Syenite, and other granites, with old sandstones, are the characteristic features of Upper Egypt and the Nubian steppe, while Abyssinia has also a granite base underlying dolerites, trachytes, and crystalline slates. A great diluvial plain stretches from this region through Senaar southward to the crystalline slates, associated with magnetic iron ores of the Baginze slopes, about the source of the Welle. The Sahara is characterized by the absence of late sedimentary rocks and marine fossils, and by the prevalence of old sandstones, quartz, and carboniferous limestones. It also abounds in rich saline deposits, forming a chief article of trade with the neighboring Soudan, which is distinguished by the almost total absence of salt, the prevailing formations here being crystalline rocks, granites, diorites, slates, gneiss, again associated with sandstones in the higher ranges. In the Kong uplands, the sandstones overlie the granites, which in the Teggele group (Kordofan) pass over to porphyrics and syenites, with gneiss interspersed with extensive diorite and auriferous quartz veins. Gold, mined by the ancient Egyptians at Mount Elba, Red Sea coast, occurs also in many other places, as in Upper Guinea, the Lower Zambezi, and Transvaal; and gold dust has at all times formed a chief article of export. But iron and copper are the characteristic metals, iron ores abounding almost everywhere, and copper in Namaqualand, the Congo basin, Dar-Fertit, and many other places. The basin of the Vaal is one of the richest diamontiferous regions on the globe. In this southern region granites and crystalline slates form the substratum of a great series of fossiliferous rocks.

Climate. — The climate of Africa is mainly influenced by the fact that it lies almost entirely within the tropics. In the equatorial belt, both north and south, rain is abundant and vegetation very luxuriant, dense tropical forests prevailing for about  $10^{\circ}$  on either side of the line. To the north and south of the equatorial belt the rainfall diminishes, and the forest region is succeeded by an open pastoral and agricultural country. This is followed by the rainless regions of the Sahara on the north and the Kalahari Desert on the south, extending beyond the tropics, and bordering on the





agricultural and pastoral countries of the north and south coasts, which lie entirely in the temperate zone. The low coast regions of Africa are almost everywhere unhealthy, the Atlantic coast within the tropics being the most fatal region to Europeans.

Vegetation. - About 41 per cent. of the surface of Africa is either desert, or under scrub, or otherwise absolutely waste, and 35 per cent. steppe, or nearly treeless grass-grown savannah, leaving only 24 per cent. for forest and arable lands. The continuous forest growths are confined mainly to the vast equatorial region between the Upper Zambezi and Soudan, and to some isolated tracts about the Abyssinian plateau, in the Moroccan Atlas, all along the Guinea coast, about the Middle Limpopo and Zambezi, and in parts of Masai Land and the Upper Nile basin. From Sierra Leone to the river Ogoway, along the coast, the one prevailing landscape is that of endless forest. This is, in fact, part of the forest region-the forest belt, which has a distinctive fauna and flora, and which extends eastward, near the equator, more than half way across Africa to Lake Victoria Nyanza and the western shores of Tanganyika. In the extreme north of Africa are found the olive, date, several kinds of oak, eucalyptus, halfa (exported for paper making) papyrus, lotus, and there have recently been introduced cereals, cotton and tobacco. In the Soudan and Guinea are the forest regions containing a magnificent baobab, the banana, butter-tree, ebony, oil palm, musanga, mangrove, ground nut, dragon tree, acacias, mimosas. In the cape region the vegetation consists mostly of shrubs, grasses, ferns, heathers.

Zoology.-Africa is the home of the largest members of the animal kingdom, and owing to the absence of great central mountain barriers they may be found in all regions without special modification of type. Among the carniverous animals, the lion, the panther, hyena, leopard, fox, and jackal. The herbivorous animals are the elephant, rhinoceros, buffalo, giraffe, ostrich, hippopotamus, and crocodile. Several species of antelopes are also found. The monkey family is spread over the whole continent represented by numerous types such as the Babbaray variety, the dog-faced baboon, the Gallago lemur, the colobus, and the anthropoid chimpanzee and gorilla. Animals resembling the horse are the zebra, quagma, the pigmy Mauritanian ass, and the camel. Of the mammals there are about 500 species peculiar to this continent, of which about 50 are the antelope family. The birds found in Africa are the ostrich, secretary, ibis, guinea fowl, weaver bird, roller bird, love bird, wax bill. whydah, sun bird, parrot, quail, and others. The reptiles and insects are the huge python, many poisonous snakes, termites, locusts, the destructive Tsetse fly, and the donderobo.

Population.—The population of A. is estimated at about 200,000.000. N. of the Soudan, the Berber race prevails from the Atlas Mountains to Libya; the Nubians are partly of Arab and partly of Negro origin, while the Copts of Egypt belong probably to the Semitic family, but the frequent conquests and colonizations of the n. African seaboard both in early and later times have complicated the question of race. Turks are numerous in Tunis, Tripoli, and Egypt. The middle of A. is peopled almost entirely by the Ethiopian or Negro family, and the s. is occupied by the Hottentots and Kaffirs-members probably of the same great family. There are about 1,110,000 Europeans (immigrants or descendants of immigrants): 448,000 in northern Africa, 640,000 in southern Africa, and 22,000 within the Tropics. Nearly one-half of the population of Africa are Mohammedans. Christianity is found among the Europeans, and, in a corrupt form, in Abyssinia. It embraces about 9,000,-000 people. There are about 1,000,000 Jews. The remaining portions are heathen, following varieties of fetichism, etc.

Commerce.—The trade of A. is in a great measure carried on by barter. The internal trade is in the hands of the Arabs, and (in Soudan) the Mandingoes and Fulahs. It is conducted by caravans crossing the interior, especially the deserts of the n. The coast trade is chiefly in the hands of Europeans. The coast The principal exports are coffee, sugar, rice, dates, palm-oil, gum, cotton, ivory, spices, musk, wax, and gold-dust. The traffic in slaves has been a great blot on African commerce, the slaves being brought from the interior to the coasts. In 1873 Great Britain made a treaty with the Sultan of Zanzibar, by which he agreed to abolish slavery in his dominions; and Sir Samuel Baker returned in the same year from a successful expedition up the Nile, organized by the Khedive of Egypt, ostensibly for the purpose of putting down the slave traffic. Until the slave trade is extinct, the legitimate commerce of A. cannot be fully developed. The total trade of Africa is estimated at 47 millions sterling worth of imports, and the same of exports. Of these imports, 19 millions are classed as British, and 14 millions as French; while 18 millions and 12 millions are the values of the British and French exports.

In nearly all of the important states railway systems are being built from the coast cities inland. Already Egypt has a railway system operating 1,200 miles of railway, and a railway is under construction on the left bank of the Lower Congo by the Belgian Government, and in Cape Colony a railway connects Grahamstown with Port Elizabeth. Since 1888 the South African railways have been developed along the lines of the common continental system. This system already extends to Pretoria, capital of the South African Republic, and Johannesburg in the same state, and it is intended to extend the system to Zambezi, and thence on to Buluwayo and Salisbury. Cape Colony has about 8,000 miles of roads, and government railways of 2,300 miles in total length. Many railways have been projected which are only on paper or just begun. One of the principal roads under consideration is a line about 650 miles





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long from the coast at Mombasa to Lake Victoria Nyanza. Mombasa is connected with the coast by telegraph lines, and with Zanzibar by submarine cable.

History .- The Phœnicians are known to have formed establishments on the northern coast of A., probably not less than 3,000 years ago; and the conquest of Egypt by Cambyses dates as far back as the year B. c. 525. The coasts of Egypt, of the Red Sea, and of the Mediterranean, were well known to the ancient Asiatics, who were constantly passing the narrow isthmus which divided their country from Africa. But whether they were acquainted with the western coast, and the eastern coast washed by the Indian Ocean, has not yet been satisfactorily answered. Egypt, under the Ptolemies, possessing the advantage of the only great river which falls from the continent into the Mediterranean, made no progress beyond its ancient boundaries. The Romans, who subsequently possessed Egypt, extended their discoveries no further than Fezzan and the region of the Upper Nile. The Arabs, by means of the camel, were able to penetrate across the great desert to the very center of the continent, and along the two coasts as far as the Senegal and the Gambia on the west, and to Sofala on the east. On this latter coast they planted colonies at Sofala, Mombasa, Melinda, and at various other places.

The 15th century produced a new era in maritime discovery. The voyages of the Portuguese were the first to give anything like an accurate outline of the coasts, and to complete the circumnavigation of Africa.

With Mungo Park, strictly speaking, commences the era of unceasing endeavors to explore the interior. He proceeded in 1795 from the river Gambia on the west coast, to the Niger, traced this river as far as the town of Silla, determined the southern confines of the Sahara, and returned in 1797. In 1805 he embarked on a second journey in the same regions, which cost him his life. In 1798 Dr. Lacerda, a scientific Portuguese traveler, made the first great journey in southeastern Africa, inland from Mozambique, and reached the capital of the African king, known as the Cazembe, in whose country he died. In 1849 James Richardson, an experienced African traveler, commanded an expedition which started from Tripoli, penetrated to Mourzouk, then passed over the Sahara. This party gave to the world its first accurate knowledge of the Soudan. From 1862 onward, many French travelers and soldiers have done much to solve the geographical problems of northwestern Africa, and in 1880 two Frenchmen, MM. Moustier and Ziveifel, discovered the source of the Niger.

Between 1847 and 1852 Doctors Krapf and Rebman traveled 100 leagues inland from the eastern coast, and discovered Kilima-Njaro and Mount Kenia, and heard of great lakes lying beyond. The London Geographical Society sent an expedition in that direction, under the command of Captains Burton and Speke. The result of their expedition was the discovery of Lake Tanganyka and the Victoria Nyanza.

The news of these discoveries awakened great interest throughout Europe, and African travel was thenceforth undertaken with ardor. In every direction travelers pierced the continent. Between 1869 and 1873 Sir Samuel Baker, under the auspices of the khedive, made a second expedition up the Nile for the purpose of suppressing the slave traffic. On this expedition he completed the survey of Albert Nyanza.

David Livingstone's explorations began substantially in 1840, when he first went out to south Africa as a missionary; but it was not until 1849 that he crossed the great southern plateau, and discovered Lake N'gami. Between 1851 and 1854 he ascended the Zambezi River for several hundred miles, and crossing the interior westward, reached Loanda on the Atlantic coast. On this journey he dis-covered Victoria Falls. Returning to the Cape he made preparations for his last journey. He reached the Chambezi River, south of Tanganyka, in 1868. Livingstone traced this river through three lakes, and it was his belief that it was the true source of the Nile. We know it now to be the head waters of the Congo. In 1871 Henry M. Stanley, then a re-porter on the New York *Herald*, was sent by his employer, James Gordon Bennett, to flud Livingstone. He reached Zanzibar in January, 1871, organized a caravan, and started for Lake Tanganyka. In the following November he reached his destination and delivered supplies to Livingstone. Stanley remained with Livingstone four months, discovering the River Rusizi flowing into the north end of the lake. Stanley returned home, and Livingstone continued his explorations until May, 1873, when he died. In 1873 the Geographical Society of London resolved to continue Livingstone's explorations, and sent out Lieut. Cameron. His orders were to find Livingstone, if living, and place himself under his command. At Zanzibar he organized an expedition, marched westward, and reached Tabora, or Kazeh, where he heard of Livingstone's death. He found Livingstone's last journals and papers, and sent them home. In his further explorations he came to the conclusion, which subsequently was proved to be correct, that Tanganyka and the Lualaba did not belong to the Nile system, but to the Congo. In 1874 Henry M. Stanley was sent, at the expense of the New York Herald and the London Telegraph, to continue Livingstone's explorations. Organizing at Zanzibar, Stanley visited the mountains that separate the basin of the Indian Ocean from Tanganyka and the Nile. He discovered the most southern source of the Nile, and ex-plored the rivers Livumba and Shimiyu. In the spring of 1875 he completely circum-navigated Victoria Nyanza, and surveyed its shores. Going south he discovered another large lake, the Muta Nzige, now known as Albert Edward Nyanza, and arrived at Ujiji on Lake Tanganyka. The river swept to the north, but following the stream, he descended

to the Atlantic, thus proving the Lualaba and the Congo to be Identical. His travels had lasted three years. In 1879 Stanley was again sent out to Africa under the auspices of the International Association, at the head of which was the King of Belgium, for the purpose of founding the Congo Free State. Stations were established along the Congo River. Roads were built, and many of the affluents of the river were explored. The whole country is now being rapidly opened to trade. De Brazza, a French naval officer, made several expeditions in the equatorial region and on the Congo between 1878 and 1880. A Portuguese explorer, Maj. Serpa Pinto, crossed the continent from Benguela to the Zambezi in 1877 and 1878. In 1880 Joseph Thompson explored the region between Nyassa and Tanganyka, and in 1884 made a journey from Mombasa, by Kilima-Njaro and Mount Kenia, across Masai Land to Victoria Nyanza. In 1881-82 De Pogge and Lieut. Wissmann crossed the continent from west to east in twenty-three months. Other travelers in the various quarters of the Congo region were Dr. Junker, Mr. Grenfell, Capello and Ivens, and Dr. Oscar Wolf.

The reports of the wonderful fertility and resources of the great lake region of the Upper Nile stimulated the Khedive of Egypt to add all those provinces to his own. Gen. Gordon was appointed to rule over them. After the death of Gordon the Mahdists began to threaten Emin Bey, governor of Equatoria, or Emin Pasha, as he was then known, and he fell back from Lado south to Wadelai on the branch of the Nile which issues from Albert Nyanza. For months and months he heard nothing from Egypt, though he knew the Soudan was in rebellion, and that his own safety was threatened. In December, 1886, a relief expedition was organized, and the command of the expedition given to Henry M. Recruiting a force at Zanzibar, Stanley. Stanley carried it by steamer around the Cape to the Congo, and thence up that river to its junction with the Aruwimi, and then up the Aruwimi to Yambuya, 1,300 miles from the sea. This point was reached June 15, 1887. Divid-ing his command, he left the rear guard, under the command of Maj. Edmund Barttelot, and on June 28, with 389 men, plunged into the great African forest. The objective point was Kavalli, a village at the southern extremity of Albert Nyanza, distant 330 geographical miles from Yambuya, estimated at 550 English miles. For 160 days Stanley marched forward with his men through jungle and bush and forest. From two to ten miles a day was the rate of travel, so difficult was it to make a road through the jungle. They passed through many villages of hostile tribes and had many skirmishes with them. In this great forest dwell the Pygmies, or Wambutti dwarfs. De-cember 5, they came out upon a beautiful grassy plain over which roamed buffaloes, antelopes, and other varieties of wild animals. Two miles to the east of where they emerged, a tall peak arose 4,600 feet above the sea,

named by Stanley, Mount Pisgah. A range of mountains lay farther eastward, at the foot of which rolled the Albert Nyanza, the objective point of the expedition. The natives were hostile, and several battles took place. On December 14 he reached Kavalli, but he could learn no word of Emin, who was still a twenty-five days' march off. On April 18, 1888, Stanley received a letter from Emin. On April 29 they met. After delivering a portion of supplies to Emin, Stanley turned back into the forest in quest of his rear guard. He found the remains of the rear guard at Yambuya in a terrible plight. Major Barttelot had been murdered, and all the European officers except Mr. Bonny, were gone. More than half of the force had deserted or were dead. Stanley led the remainder through the forest to Albert This great African forest stretches Nyanza. in unbroken density north and south 621 miles, with an average breadth of 517 miles. Innumerable insects swarm everywhere. Birds of many varieties inhabit the trees, while wild animals, all manner of reptiles, lemurs, chimpanzees, and baboons make their homes in its dark recesses. Added to these are the various tribes of the forest, among them the dwarfs.

In January, 1880, he succeeded in bringing his forces, or what remained of them, to Kavalli. Three months more were occupied in making preparations to escort Emin Pasha and his people to the sea-coast at Zanzibar. April 10 the caravan started from Albert Nyanza and, December 4 following, safely reached Bagamonya. This expedition of Stanley's leaves little to be discovered in Africa that is now absolutely unknown. All that remains to be done is detail, in the way of accurate measurements and observations. The origin and meaning of the name of this continent has been a fertile subject for conjecture. By the Greeks it was called Libya, and by the Romans, Africa. With respect to the word Africa, Suidas tells us that it was the proper name of that great city which the Romans called Carthago. It was subsequently extended with their increasing knowledge, till it came at last to include the whole continent.

Agamem'non, son of Atreus, king of Mycenæ and Argos, brother of Menelaus, and commander of the allied Greeks at the siege of Troy. Returning home after the fall of Troy, he was treacherously assassinated by his wife, Clytemnestra, and her paramour. Ægisthus. He was the father of Orestes, Iphigenia, and Electra.

Aganippe (nip'ē), a fountain on Mount Helicon, in Greece, sacred to the Muses, which had the property of inspiring with poetic fire whoever drank of it.

Agar'ic, a large and important genus of fungi. Over a thousand species are known, and are arranged in five sections according as the color of their spores is white. pink, brown, purple, or black. Many of the species are edible, like the common musbroom, and supply a delicious article of food, while others are poisonous.

Agaric Mineral, or Mountain-Meal, one of the purest of the carbonates of lime, found

3

### Agasias

chiefly in the clefts of rocks and at the bottom of some lakes in a loose or semi-indurated form resembling a fungus. The name is also applied to a stone of loose consistence found in Tuscany, of which bricks may be made so light as to float in water, and of which the ancients are supposed to have made their floating bricks. It is a hydrated silicate of magnesium, mixed with lime, alumina, and a small quantity of iron.

Aga'sias, a Greek sculptor of Ephesus, about 400 B. c., whose celebrated statue, known as the Borghese Gladiator, representing a soldier contending with a horsemañ, is now in the Louvre, Paris.

Agassiz (ag'as-ē), Alexander (1835son of Louis Agassiz, was born in Neuchâtel, Switzerland. He came to the U.S. in 1849, and graduated at Harvard in 1855. He He was on the California Coast Survey, and was with his father in the museum of zoology at Cambridge, Mass. From 1866 to 1869, he was superintendent of the Calumet and Hecla copper mines, Lake Superior, and amassed a great fortune, of which he gave liberally to Harvard. He was curator of the museum in Cambridge from 1874 to 1885. Professor Agassiz is a member of the National Academy of Sciences and other scientific societies in this country and Europe. He is one of the great authorities on marine zoology.

Agassiz, Louis John Rudolph (1807-1873), an eminent naturalist, son of a Swiss Protestant clergyman. He completed his education at Lausanne, and early developed a love of the natural sciences. He studied medicine at Zürich, Heidelberg, and Munich. His attention was first specially directed to ichthyology by being called on to describe the Brazilian fishes brought to Europe from Brazil by Martius and Spix. Directing his attention to fossil ichthyology, five volumes of his appeared between 1834 and 1844. His researches led him to propose a new classification of fishes which he divided into four classes, distinguished by the characters of the skin. His system has not been generally adopted, but the names of his classes have been used. In 1836 he began the study of glaciers. From 1838 he had been professor of natural history at Neuchâtel, when in 1846 pressing solicitations and attractive offers induced him to settle in America, where he was connected as a teacher first with Harvard University, Cambridge, and latterly with Cornell University as well as Harvard. After his arrival in America he engaged in various investigations and explorations, and published numerous works. In 1865-66 he made zoological excursions and investigations in Brazil, which were productive of most valuable results. Agassiz held views on many important points in science different from those which prevailed among the scientific men of the day, and in particular he strongly opposed the theory of evolution.

Agassiz, Mount, an extinct volcano in Arizona, 10,000 feet in height; a place of summer resort, near the Great Cañon of the Colorado.

Ag'ate, a siliceous, seml-pellucid compound mineral, consisting of bands or layers of various colors blended together: the base generally being chalcedony, and this mixed with variable proportions of jasper, amethyst, quartz, opal, heliotrope, and carnelian. The varying manner in which these materials are arranged causes the agate when polished to assume some characteristic appearances, and thus certain varieties are distinguished, as the ribbon agate, the fortification agate, the zone agate, the star agate, the moss agate, the clouded agate, etc. In Scotland they are cut and polished under the name of Scottish pebbles. Agates are found at Agate Bay, Lake Superior, and in Colorado. In Apache co., Ariz., is a wonderful petrified forest where the ground is covered with immense tree trunks turned to agate and jasper. Agatized wood is found also in Utah, New Mexico, and California.

**Agathar'chus**, a Greek painter, native of Samos, the first to apply the rules of perspective to theatrical scene-painting; flourished about 480 B. C.

Agathocles (361?-289, B. C.), Tyrant of Syracuse. He was the son of a Sicilian potter. After working a while at his father's trade he became a leader of banditti. He afterward became a soldier under Damas, and on the latter's death married his widow, thus acquiring immense wealth and laying the foundation of his political fortunes. He became autocrat of Syracuse in 317 B. c. He declared all debts canceled, confiscated the property of the rich and divided it among the poor. His next plan was to drive the Carthaginians out of Sicily and bring the whole island under the government of Syracuse. He was defeated by Hamilcar, the Carthaginian governor. In 310 Agathocles attacked the Carthaginian possessions and was at first successful, but in 307 a decisive battle was fought with the Cartha-

ginians, who utterly defeated the invaders. Agathocles returned to Sicily, having made terms with the Carthaginians. He next made an attack on a people of southern Italy, made the Lipari Islands tributary, and seized the power in Crotona on the mainland. Soon afterward he died. During the despotism of Agathocles the naval power of Syracuse was raised to a place of considerable importance.

Agave (a-gā' vē). a genus of plants, popularly known



Agave.

as American aloes. They are generally large. and have a massive tuft of fleshy leaves with a spiny apex. They live for many years - ten to seventy according to treatment—before flowering. When this takes place the tall flowering stem springs from the center of the tuft of leaves, and grows very rapidly until it reaches a height of 15, 20, or even 40 feet, bearing toward the end a large number of flowers. The best known species is the common American aloe now extensively grown in the warmer parts of Europe and Asia. The sap when fermented yields a beverage resembling cider, called by the Mexicans "pulque." The leaves are used for feeding cattle; the fibers of the leaves are formed into thread, cord, and ropes; an extract from the leaves is used as a substitute for soap; slices of the withered flowerstem are used as razor-strops.

Age, a period of time representing the whole or a part of the duration of any individual thing or being, but used more specifically in a variety of senses. In law age is applied to the periods of life when men and women are enabled to do that which before, for want of years and consequently of judgment, they could not legally do. Full age in male or female is twenty-one years, which age is completed on the day preceding the anniversary of a person's birth, who till that time is an infant in law.

The term is also applied to designate the successive epochs or stages of civilization in history or mythology. Hesiod speaks of five distinct ages: I. The Golden or Saturnian Age, a patriarchal and peaceful age. 2. The Süter Age, licentious and wicked. 3. The Brazen Age, violent, savage, and warlike. 4. The Heroic Age, which seemed an approximation to a better state of things. 5. The Iron Age, when justice and honor had left the earth. The term is also used in such expressions as the Dark Ages, the Middle Ages, the Elizabethan Age, etc.

Age, etc. The Archaological Ages or Periods are three the Stone Age, the Bronze Age, and the Iron Age, these names being given in accordance with the materials chiefly employed for weapons, implements, etc., during the particular period. The Stone Age of Europe has been subdivided into two — the Palæolithic or earlier, and the Neolithic or later. The word age in this sense has no reference to the lapse of time, but simply denotes the stage at which a people has arrived in its progress toward civilization. See Archaology.

Agent, in law, a person employed to act for another, called the principal, the relation between them being called agency. With reference to the authority conferred upon him, an agent may be general or special, and may be appointed expressly or by implication. No particular form of appointment is required, with a few qualifications, as that an instrument under seal is necessary to confer authority to do an act in the name of the principal under seal. Attorneys, auctioneers, brokers, factors, and shipmasters are among the ordinary classes of agents. The agent may

bind his principal by acts within the scope of his authority. He is personally liable to third persons on contracts made as the agent of an undisclosed principal, but not on those in behalf of a disclosed principal, unless he exceed his authority. Public agents are not usually themselves liable upon contracts made in their official capacity. As to torts the general rule is that the principal is liable to third persons for the tortious acts of the agent committed when acting within the scope of his agency; but this does not relieve the agent of personal liability himself. As against the principal, an agent is entitled to compensation for his services, and reimbursement for the expenses of his agency, and for personal loss or damage in properly transacting the business thereof. As a means of enforcing these rights, the law gives him a lien upon the property of the principal in his hands.

Agesila'us (442-300 B. C.), a king of Sparta. He acquired renown by his exploits against the Persians, Thebans, and Athenians. Though a vigorous ruler, and almost adored by his soldiers, he was of small stature and lame from his birth. He died in Egypt. Xenophon, Plutarch, and Cornelius Nepos are among his biographers.

among his biographers. Agglu'tinate Languages, languages in which the modifying suffixes are, as it were. glued on to the root, both it and the suffixes retaining a kind of distinctive independence and individuality, as in the Turkish and other Turanian languages, and the Basque language.

Agincourt (a-zhan-kör), a village of northern France, department Pas de Calais, famous for the battle of Oct. 25, 1415, between the French and English.

Agis ( $\ddot{u}'jis$ ), the name of four Spartan kings. the most important of whom was Agis IV, who succeeded to the throne in B. c. 244, and reigned four years. He was entrapped and executed by his rival, Leonidas.

Agnesi (à-nyā'sē), MARIA GAETANA (1718-1799), a learned Italian lady, born at Milan. In her ninth year she was able to speak Latin, in her eleventh Greek; was a University professor.

Agnew, D. HAYES, American surgeon (1818-1892). He was a specialist on diseases of the eye and of women. He was a profound anatomist, and had wonderful skill and ease in operating. Sympathetic and gentle, he was an ideal physician and consultant. He was emeritus professor of surgery, and honorary professor of clinical surgery, at University of Pennsylvania. He became widely known through his treatment of President Garfield's wound. Doctor Agnew has written Practical Anatomy (1856), and The Principles and Practises of Surgery (1878-83).

Agnostics (ag-nos'tiks), a modern term applied to those who disclaim any knowledge of God or of the origin of the universe, holding that the mind of man is limited to a knowledge of phenomena and of what is relative, and that, therefore, the infinite, the absolute. and the unconditioned, being beyond all experience, are consequently beyond its range.

Agnus Del (dē'ī), a term applied to Christ in John 1:29, and in the Catholic liturgy a prayer beginning with the words "Agnus Dei," generally sung before the communion. The term is also commonly given to a medal, or more frequently a cake of wax, consecrated by the pope, stamped with the figure of a lamb supporting the banner of the cross.

Agouti (a-gö'ti), the name of several rodent mammals, forming a family by themselves. There are eight or nine species, all belonging to S. America and the W. Indies. The com-



Agouti.

mon agouti, or yellow-rumped cavy, is of the size of a rabbit. It burrows in the ground or in hollow trees, lives on vegetables, doing much injury to the sugar-cane, is as voracious as a pig, and makes a similar grunting noise. Its flesh is white and agreeable.

Agra (ä'gra), a city of India, in the n. w. Provinces, 841 miles from Calcutta. It has interesting structures, among which are the imperial palace, the Motí Masjid, or Pearl Mosque: the mosque called the Jama Masjid (a cenotaph of white marble); and the Taj Mahal, a mausoleum of the seventeenth century, built by the emperor Shah Jehan to his favorite queen. Agra has a trade in grain, sugar, etc., and manufactures, including inlaid mosaics. It was founded in 1566 by the emperor Akbar, and was a residence of the emperors for over a century. Pop. 160,203. The Agra division has an area of 10,151 sq. mi., and a population of 4,834,064.

Agram (og'rom), or Zagrab, a city in the Austrian Empire, capital of Croatia and Slavonia, contains the government buildings, cathedral, university, theater, etc.; carries on an active trade, and manufactures tobacco, leather, and linens. Pop. 28,360.

Agra'phia. See *Aphusia*. Agrarian Laws, laws enacted in ancient Rome for the division of the public lands. The right to the use of the public land belonged originally only to the ruling class; but latterly the claims of the plebeians on it were also admitted, though they were often un-fairly treated in the sharing of it. Hence arose much discontent among the plebeians, and various remedial laws were passed with more or less success.

Agric'ola, CNEIUS JULIUS (A. D. 37-93), a Roman consul under the emperor Vespasian. reduced the greater part of Britain to the

dominion of Rome; distinguished as a statesman and general. His life, written by his son-in-law, Tacitus, gives the best extant account of Britain in the early part of the period of the Roman rule. He was the twelfth Roman general who had been in Britain, but was the only one who effectually subdued the southern portion of it and reconciled the Britons to the Roman yoke. He constructed the chain of forts between the Forth and the Clyde, and sailed round the island, discovering the Orkneys.

Ag'riculture is the art of cultivating the ground, more especially with the plow and in large areas or fields, in order to raise grain and other crops for man and beast; including the art of preparing the soil, sowing and planting seeds, removing the crops, and also the raising and feeding of cattle or other live stock. This art is the basis of all other arts, and in all countries coeval with the first dawn of civilization. At how remote a period it must have been successfully practised in Egypt, Mesopotamia, and China we have no means of knowing. Egypt was renowned as a corn country in the time of the Jewish patriarchs. Among the ancient Greeks the implements of agriculture were very few and simple. Hesiod, in the eighth century B. C., mentions a plow consisting of three parts, the sharebeam, the draught-pole, and the plow-tail. The ground received three plowings, one in autumn, another in spring, and a third immediately before sowing the seed. Manures were applied, and the advantage of mixing soils, as sand with clay, or clay with sand, was understood. Seed was sown by hand, and covered with a rake. Grain was reaped with a sickle, bound in sheaves, thrashed, then winnowed by wind, laid in chests, bins, or granaries, and taken out as wanted by the family, to be ground. Agriculture was highly esteemed among the ancient Romans. Cato, the censor, derived his highest honors from having written a voluminous work on agriculture. In his Georgics Vergil has thought the subject of agriculture worthy of being treated in the most graceful and harmonious verse. The Romans used a great many different imple-

ments of agriculture. The plow is repre-sented by Cato as of two kinds, one for strong, the other for Varro light soils. mentions one with two mold-boards. Pliny mentions a plow



with one mold-board, and others with a coulter. Fallowing was a practise rarely deviated from by the Romans. Manure was collected from nearly or quite as many sources as have been resorted to by the moderns. Irrigation on a large scale was applied both to arable and grass lands.

The Romans introduced their agricultural knowledge among the Britons, and during the most flourishing period of the Roman occupation large quantities of corn were exported

#### Agriculture

from Briton to the Continent. Swine formed a most important portion of the live stock. The feudal system introduced by the Normans operated powerfully against progress in agricultural improvements. War and the chase formed the most prominent occupations of the Norman princes and nobles. Thriving villages and smiling fields were converted into deer



forests, vexatious imposts were laid on the farmers, and the serfs had no interest in the cultivation of the soil. But the monks of every monastery retained such lands as they could take charge of, and these they cultivated with great care under their own inspection, and frequently with their own hands.

The first English treatise on husbandry was published in 1534. It is entitled the Book of Husbandry, and contains directions for drain-

ing, clearing, and enclosing a farm. for enriching the soil, and rendering it fit for tillage. Lime, marl, and fallowing are strongly recom-mended. The subject of agriculture attained some prominence during the reign of Eliza-sowing - Ancient Egyptian.



Tusser's Fire Hundred Points of Good beth. Husbandry (published in 1580) conveys much useful instruction in meter, but few works of this time contain much that is valuable. About 1645 the field cultivation of red clover was introduced into England. The Dutch had devoted much attention to the improvement of winter roots, and also to the cultivation of clover and other artificial grasses, and the farmers and proprietors of England soon saw the advantages to be derived from their



Winnowing.

introduction. Potatoes had been introduced during the latter part of the sixteenth century, but were not for long in general cultivation. Robert Bakewell and others in the eighteenth century effected some important improvements in the breeds of cattle, sheep, and swine. By the end of the century

it was a common practise to alternate green crops with grain crops, instead of exhausting the land with a number of successive crops of corn. During the wars caused by the French revolution (1795-1814) the high price of agricultural produce led to an extraor-dinary improvement in agriculture. In Europe at large the principal cereals are wheat,

# Agriculture

oats, barley, and rye; wheat being mostly grown in the middle and southern regions, such as France, Spain, part of Germany, Austria, Hungary, Italy, and southern Russia, the others in the more northern portion. while maize is grown in the warmest parts. Turnips are comparatively little grown out of Britain, beet-root in some sense taking

their place; potatoes, however, are largely cultivated, except in the south. In Canada large quantities of wheat are grown (chiefly in Ontario, now also in Manitoba); much is also now produced in the Australian colonies.

The vast territory of the U.S. presents every variety of soil and climate. Its agriculture embraces all the products of European cultivation, together with some of the warmer countries, as cotton, sugar, and indigo. The U. S. exceeds all other nations in their wonder-

ful adaptation of machinery for all purposes of cultiva-tion and harvesting The disof crops. position of the American to experiment, to test alleged improvements, and adopt



Egyptians Reaping.

labor-saving expedients, gives a great impulse to the genius of inventors. This mental activity of the American farmer is owing in great part to his superior intelligence.

The American reaper was invented by Mc-Cormick in 1834; by many improvements it has secured the European as well as the home market. In 1855 the first American agricultural college was established. In 1862 the passage of the *Homestead* law served to accelerate the occupation of the public lands. In the same year Congress granted to each state 30,-000 acres for each Senator and Representative in Congress in order to promote the liberal and practical education of the industrial classes. In 1867 the organization of the "Patrons of Husbandry," commonly called Grangers, was



effected, to look after the interests of farmers, to reduce the profits of middlemen, and to insist on fair treatment from the railroads. The dairy system, based on the principle of as-

Threshing by the Norey.

sociation, has advanced rapidly. Agricultural societies, both state and county, are established in all parts of the U.S. The objects of these societies are such as the following: To encourage the introduction of improvements in agriculture; to encourage the improvement of agricultural implements and farm buildings; the application of chemistry to agriculture; the destruction of insects injurious to vegetation; to promote the discovery and adoption of new varieties of grain, or other useful vegetables; to collect information re-



#### Agriculture

garding the management of woods, plantations, and fences; to improve the education of those supported by the cultivation of the soil; to improve the veterinary art; to improve the breeds of live stock, etc. Fairs are held, at which prizes are distributed for live stock, implements, and farm produce.

Through the efforts of the above-mentioned and other societies, the investigations of scientific men, and the general diffusion of knowledge among all classes, over two hundred periodicals being devoted to its interests, agriculture has made great progress during the

present century. Among the chief improvements we may mention deep plowing and thorough draining. By the introduction of new



Syrian Comdrag.

or improved implements the labor necessary to the carrying out of agricultural operations has been greatly diminished. Science, too, has been called in to act as the handmaid of art, and it is by the investigations of the chemist that agriculture has been put on a really scientific basis. The organization of plants, the primary elements of which they are composed, the food on which they live, and the constituents of soils, have all been investigated, and most important results obtained, particularly in regard to manures and rotations. Artificial manures in great variety, to supply the elements wanted for plant growth, have come into common use, not only increasing the produce of lands previously cultivated, but extending the limits of cul-tivation itself. An improvement in all kinds of stock is becoming more and more general, feeding is conducted on more scientific principles, and improved varieties of plants used as field crops have been introduced. One of the valuable innovations in the U.S. is the introduction of the system of ensilage for preserving fodder in a green state, which gives valuable results. As a result of the new conditions, to be a thoroughly trained



Modern Syrian Plow.

and competent agriculturist requires a special education, partly theoretical, partly practical. In particular, no scientific cultivator can now be ignorant of agricultural chemistry, which teaches the constituents of the various plants grown as crops, their relation to the various soils, the nature and function of different manures, etc. Nearly all the states have colleges, or departments of colleges, devoted to the teaching of agriculture, and large allot

11

#### Aguilar

ments of public land have been made for their support. In Germany such institutions are numerous and highly efficient. For teaching agriculture practically model farms are commonly established. In many countries, too, there is a ministry of agriculture as one of the chief departments of government. In the U. S. the Department of Agriculture was organized in 1862, the secretary of which is now a cabinet officer. The chief crop in value grown in the U. S. is Indian corn, next to which comes wheat. Oats and potatoes are also important crops. The grass crop exceeds in value any other, except wheat and corn. The other principal crops are, barley, rye, buckwheat, beets, turnips, carrots, parsnips, and sorghum. Tobacco is a favorite crop in the southern states. In cotton the virtual monopoly of the southern states has ceased; but the crop increases steadily in amount each year.

It is only in very recent times that much progress has been made in perfecting implements and machinery for cultivating the soil, sowing seed, drilling, rolling, hoeing, reaping, digging, etc. The first application of steam to plowing dates from 1770, when Richard L. Edgeworth took out a patent for a steam plowing machine, but it was 1852 before such application proved of any economic value.

Agrigentum (-jen'tum), an ancient Greek city of Sicily, founded about 580 B. C., and long one of the most important places on the island. Extensive ruins of temples and public buildings yet attest its ancient magnificence.

ings yet attest its ancient magnificence. **Ågrip'pa**, CORNELIUS HENRY (1486-1535), born at Cologne, was a man of talents, learning, and eccentricity. In his youth he was secretary to the Emperor Maximilian I; he subsequently served seven years in Italy, and was knighted. On quitting the army he devoted himself to science, and became famous as a magician and alchemist, and was involved in disputes with the churchmen.

**Ágrippa,** MARCUS VIPSANIUS (B. C. 63-12), a Roman statesman and general, the son-inlaw of Augustus. He commanded the fleet of Augustus in the battle of Actium. To him Rome is indebted for three of her principal aqueducts, the Pantheon, and other works of public use and ornament.

**Agua** (àg'wà), an active volcano of Guatemala, rising to the height of 15,000 feet. It has twice destroyed the old city of Guatemala, in its immediate vicinity.

Aguardiente (à-gwär-dē-en'te), a popular spirituous beverage of Spain and Portugal, a kind of coarse brandy, made from red wine, from the refuse of the grapes left in the winepress, etc., generally flavored with anise; also a Mexican alcoholic drink distilled from the fermented juice of the agave. Aguas Calientes (àg'wäs kà-lē-en'tās) (lit.

Aguas Calientes (àg'wàs kà-lē-en'tās) (lit. "warm waters"), a town 270 miles n. w. of Mexico, capital of the state of its own name, named from the thermal springs near it; has manufactures of cottons and a considerable trade. Pop. 25,000.

**Aguilar** (a-gi-lär'), GRACE (1816–1847), an English writer. Of Jewish parentage, she at

# Agulhas

first devoted herself to Jewish subjects, but her fame rests on her novels, *Home Influence*, *A Mother's Recompense*, *Home Scenes and Heart Studies*, etc., most of which were published posthumously under the editorship of her mother.

Aguihas (ä-gul'yås), CAPE, a promontory, forming the most southern extremity of Africa, about 90 miles s. e. of the Cape of Good Hope, rising to 455 feet above the sea, with a lighthouse.

A'hab, the seventh king of Israel, succeeded his father Omri 928 B. C., and reigned twenty years. At the instigation of his wife Jezebel he erected a temple to Baal, and became a cruel persecutor of the true prophets. He was killed by an arrow at the siege of Ramoth-Gilead.

Ahasue'rus, in scripture history, a king of Persia, probably the same as Xerxes, the husband of Esther, to whom the Scriptures ascribe a singular deliverance of the Jews from extirpation. AHASUERUS is also a Scripture name for Cambyses, the son of Cyrus (Ezra 4: 6), and for Astyages, king of the Medes (Dan. 9:1).

A'haz, the twelfth king of Judah, succeeded his father Jotham, 742 B. c. Forsaking the true religion he gave himself up to idolatry, and plundered the temple to obtain presents for Tiglath-pileser, king of Assyria.

Ahazi'ah.—1. Son of Ahab and Jezebel, and eighth king of Israel, died from a fall through a lattice in his palace at Samaria after reigning two years (B. c. 896, 895).—2. Fifth king of Judah, and nephew of the above. He reigned but one year and was slain (B. c. 884) by Jehu.

Ahmedabad (or Ahmadabad) (ä-mad-a-bäd), a town of India, presidency of Bombay, in district of its own name, 310 miles north of Bombay. It was founded in 1412 by Ahmed Shah. It came into the hands of the British in 1818. It manufactures silk and cotton fabrics, cloths of gold and silver, pottery, paper, enamel, mother-of-pearl, etc. Pop. 127,621. Area of district 3,821 sq. mi.; pop. 856,324. Ahmednag'ar, a town of India, presidency

Ahmednag'ar, a town of India, presidency of Bombay, in district of its own name, with manufactures of cotton and silk cloths. Near the city is the fort, built of stone and 1<sup>1</sup>/<sub>4</sub> miles around. Pop. 32,841; including military, 37,492. Area of dist. 6.666 so. mi.: pop. 751.228.

Area of dist. 6,666 sq. mi.; pop. 751,228. Aidin (à-i-dên') (or Guzel Hissar), a town in Asiatic Turkey, about 60 miles southeast of Smyrna, with which it is connected by rail; has fine mosques and bazaars, is the residence of a pasha, and has an extensive trade in cotton, leather, figs, grapes, etc. Pop. 35,000.

Ailan'to (Ailanthus), a large and handsome tree, with leaves one or two feet long, a native of China, but has been introduced into Europe and North America, where it is in favor for its elegant foliage. A species of silk-worm, the ailanthus silk-worm, feeds on its leaves, and the material produced, though wanting the fineness and gloss of mulberry silk, is produced at less cost, and is more durable. The wood is hard, heavy, glossy, and is susceptible of a fine polish. Ailsa Craig, a rocky islet in the Firth of Clyde, 10 miles from the coast of Ayr, Scotland, of a conical form, 1,097 feet high, and about 2 miles in circumference, precipitous on all sides except the northeast, where alone it is accessible, frequented by innumerable seafowl, including solan-geese, and covered with grass. On it is a lighthouse.

Aimard (ā-mär), GUSTAVE (1818-1883), French novelist. He lived for ten years among the Indians of North America, and wrote a number of stories dealing with Indian life, which have been popular in English translations.

Ain (an), a southeastern frontier department of France, mountainous in the east (ridges of the Jura), flat or undulating in the west, divided into two nearly equal parts by the river Ain, a tributary of the Rhone. Area, 239 so mi Capital Bourg Pon 364 408

2,239 sq. mi, Capital, Bourg. Pop. 364,408. Ainmiller (In'mil-er), Max Emanuel (1807– 1870), a German artist who may be regarded as the restorer of the art of glass-painting. As inspector of the state institute of glass-painting at Munich he raised this art to a high degree of perfection by the new or improved processes introduced by him. Under his supervision this establishment produced a vast number of painted windows for ecclesiastical and other buildings, among the principal being a eries of forty windows, containing 100 historical and Scriptural pictures in Glasgow Cathedral. His son Heinrich, born 1837, followed in his father's footsteps.

Ainos (I'noz), the native name of an uncivilized race of people inhabiting the Japanese island of Yesso, as also Saghalien and the Kurile Islands, and believed by some to be the aboriginal inhabitants of Japan. They do not average over 5 feet in height, but are strong and active. They have matted beards 5 or 6 inches in length, and black hair which they allow to grow till it falls over their shoulders. Their whole body is covered with thick hair. They are the hairiest and also the filthiest people on the globe. Their complexion is dark brown, approaching to black. They worship the sun and moon, and pay reverence to the They support themselves by hunting bear. and fishing.

Ainsworth, WILLIAM HARRISON (1805-1882), an English novelist. He wrote Rookwood, Jack Sheppard, and about forty other novels, including Guy Faukes, Tower of London, Windsor Castle, Lancashire Witches, Flütch of Bacon, etc.

Ain-Tab (à-in-täb'), a town of northern Syria, 60 miles north of Aleppo: with manufactures of cottons, woolens, leather, etc., and an extensive trade. There is here an American Protestant mission. Pop. 20,000.

Air, the gaseous substance of which our atmosphere consists, being a mechanical mixture of 79.19 per cent. by measure of nitrogen and 20.81 per cent. of oxygen. The latter is absolutely essential to animal life, while the purpose chiefly served by the nitrogen appears to be to dilute the oxygen. Oxygen is more soluble in water than nitrogen, and hence the air dissolved in water contains about 10 per cent. more oxygen than atmospheric air. The oxygen therefore available for those animals which breathe by gills is somewhat less diluted with nitrogen, but it is very much diluted with water. For the various properties and phenomena connected with air, see such articles as Atmosphere, Aeronautics, Air-pump, Barometer, Combustion, Respiration.

Air-cells, cavities in the cellular tissue of the stems and leaves of plants which contain air only, the juices of the plants being contained in separate vessels. They are largest and most numerous in aquatic plants, as in the lily, the gigantic leaves of which are buoyed up on the surface of the water by their means.—The minute cells in the lungs of animals are also called air-cells. There are also air-cells in the bodies of birds. They are connected with the respiratory system, and are situated in the cavity of the thorax and abdomen, and sometimes extend into the bones. They are most fully developed in birds of powerful and rapid flight, such as the albatross.

Air-engine, an engine in which air heated, and so expanded, or compressed air, is used as the motive power. A great many engines of the former kind have been invented, some of which have been found to work pretty well where no great power is required. They map be said to be essentially similar in construction to the steam-engine, though of course the expansibility of air by heat is small compared with the expansion that takes place when water is converted into steam. Engines working by compressed air have been found very useful in mining, tunneling, etc., and the compressed air may be conveyed to its destination by means of pipes. In such cases the waste air serves for ventilation and for reducing the oppressive heat.

Air-gun, an instrument for the projection of bullets by means of condensed air, generally either in the form of an ordinary gun, or of a stout walking-stick and about the same length. A quantity of air being compressed into the air-chamber by means of a condensing syringe, the bullet is put in its place in front of this chamber, and is propelled by the expansive force of a certain quantity of the compressed air, which is liberated on pressing the trigger.

Air-plants (or Epiphytes), are plants that grow upon other plants or trees, apparently without receiving any nutriment otherwise than from the air. The name is restricted to flowering plants (mosses or licheus being excluded) and is suitably applied to many species of orchids. The conditions necessary to the growth of such plants are excessive heat and moisture, and hence their chief localities are the damp and shady tropical forests of Africa, Asia, and America. They are particularly abundant in Java and tropical America.

**Air-pump**, an apparatus by means of which air or other gas may be removed from an enclosed space; or for compressing air within an enclosed space. An ordinary suction-pump for water is on the same principle as the airpump; indeed, before water reaches the top

of the pipe the air has been pumped out by the same machinery which pumps the water. An ordinary suction-pump consists essentially of a cylinder, or barrel, having a valve opening from the pipe through which water is to rise and a valve opening into the outlet pipe, and a piston fitted to work in the cylinder (the outlet valve may be in the piston). See Pump. The arrangement of parts in an air-pump is quite similar. The barrel of an air-pump fills with the air which expands from the receiver (that is, the vessel from which the air is being pumped), and consequently the quantity of air expelled at each stroke is less as the exhaustion proceeds, the air getting more and more rarefied. Many interesting experiments may be made with the air-pump. If an animal is placed beneath the receiver, and the air exhausted, it dies almost immediately; a lighted candle under the exhausted receiver immediately goes out. Air is thus shown to be necessary to animal life and to combustion. A bell, suspended from a silken thread beneath the exhausted receiver, on being struck cannot be heard. If the bell be in one receiver from which the air is not exhausted, but which is within an exhausted receiver, it still cannot be heard. Air is therefore necessary to the production and to the transmission of sound. A shriveled apple placed beneath an exhausted receiver becomes as plump as if quite fresh, being thus shown to be full of elastic air. The air-pump was invented by Otto von Guericke, burgomaster of Magdeburg, about the year 1654.

**Airy**, SIR GEORGE BIDDELL, a distinguished English astronomer, b. 1801. At Cambridge he was professor of mathematics, and subsequently professor of astronomy and experimental philosophy, in the latter capacity having charge of the observatory. In 1835 he was appointed superintendent of the observatory at Greenwich. He has made numerous valuable investigations on subjects connected with astronomy, physics, and mathematics.

Aisne (ān), a department of France; area, 2,838 sq. mi. It contains the important towns of St. Quentin, Laon (the capital), Soissons, and Château Thierry. Pop. 555,925.

Aix ( $\hat{a}$ ks), a town of southern France, department Bouches-du-Rhône. Aix was founded in 123 B. c. by the Roman consul Caius Sextius Calvinus, and from its mineral springs was called Aquæ Sextive (Sextian Waters). Between this town and Arles, Marius gained his great victory over the Teutons, 102 B. c. In the Middle Ages the counts of Provence held their court here, to which the troubadours used to resort. Pop. 19,686.

Aix-la-Chapelle (āks-lā-shā-pel), a city of Rhenish Prussia, 38 miles west by south of Cologne. The most important building is the cathedral, the oldest portion of which, often called the nave, was erected in the time of Charles the Great (Charlemagne) as the palace chapel, about 796. It consists of an octagon surmounted by a cupola, in the middle being the tomb of Charlemagne. There are a number of warm sulphur springs.

here, and several chalybeate springs, with ample accommodation for strangers. It was the favorite residence of Charles the Great, who died here in 814. Thirty-seven German emperors and eleven empresses have been crowned in it, and the imperial insignia were preserved here till 1795, when they were carried to Vienna. Pop. 95.725.—Congress of Aix-la-Chapelle, a congress held in 1818, by which the army of the allies in France was withdrawn after France had paid the contribution imposed at the peace of 1815, and independence restored to France.-A treaty of peace concluded at this city, May 2, 1668, as a result of the Triple Alliance, put an end to the war carried on against Spain by Louis XIV in 1667, after the death of his father-in-law, Philip IV.—The second peace of Aix-la-Chapelle, Oct. 18, 1748, terminated the Austrian war of succession.

Ajaccio ( $\dot{a}$ -y $\dot{a}$ ch' $\ddot{o}$ ), the capital of Corsica, the birthplace of Napoleon, and the seat of a bishop, with coral and sardine fisheries, and a considerable trade. Pop. 15,351.

a considerable trade. Pop. 15,351. A'jax, the name of two Grecian chiefs who fought against Troy, the one being son of Olleus, the other, son of Telamon. The latter was from Salamis, and sailed with twelve ships to Troy, where he is represented by Homer as the boldest of the Greeks, after Achilles. On the death of Achilles, when his arms, which Ajax claimed, were awarded to Ulysses, he became insane and killed himself. This is the subject of Sophocles's tragedy Ajax.

Ajmeer' (Ajmir or Ajmer), a British commissionership in India, Rajputána, divided into the two districts of Ajmeer and Mairwara. Area 2,711 sq. mi: pop. 460,722. — Ajmeer, the capital, a favorite residence of the Mogul emperors, is 279 miles s. w. of Delhi. It is surrounded by a wall, and possesses a government college, as also Mayo College for Rajpoot nobles, a Scottish mission, a mosque that forms one of the finest specimens of early Mohammedan architecture extant, and an old palace of Akbar, now the treasury; trade in cotton, sugar, salt, etc. Pop. 34,763. Ak'bar (1542-1605), a Mogul emperor, the

Ak'bar (1542-1605), a Mogul emperor, the greatest Asiatic prince of modern times. He was born at Amerkote, in Sind, succeeded his father, Humayun, at the age of thirteen, and governed first under the guardianship of his minister, Beyram, but took the chief power into his own hands in 1560. His mausoleum at Secundra, near Agra, is a fine example of Mohammedan architecture.

A Kempis, THOMAS, See Thomas à Kempis. Akermann', a seaport of southern Russia, in Bessarabia. The vicinity produces quantities of salt and also fine grapes, from which excellent wine is made. A treaty was signed here, Oct. 6, 1826, between Russia and the Porte, by which Moldavia, Wallachia, and Servia were released from all but nominal dependence on Turkey. Pop. 29.609.

Turkey. Pop. 29,609. Akmollinsk', a Russian province in Central Asia, largely consisting of steppes and wastes. Area 210,000 sq. mi.; pop. 463,347. — Akmollinsk, the capital, is a place of some importance for its caravan trade. Pop. 3,130.

Akron, Summit co., O., 35 miles s. e. of Cleveland. Railroads, Erie; B. & O.; C. A. & C.; A. & C. Junction; P. & W.; C. T. & V.; and Northern Ohio. Industries, rubber works, five cereal mills, iron foundry, sewer pipe, linoleum, boiler, farm implements, and other factories, printing works, and potteries. Surrounding country agricultural, bituminous coal in vicinity. The town was first settled in 1810 and became a city in 1836. Pop. est. 1897, 40,000.

Alabama, one of the southern states of the the U. S. Its length is 330 miles, average breadth 154, and area 50,722 sq. mi. The Alleghany range stretches into the northern portion of the state, but the elevation is nowhere great. The Alabama is the chief river of the state. It is formed by the junction of the Coosa and the Tallapoosa, which unite about 10 miles above the city of Montgomery. Fortyfive miles above Mobile the Alabama is joined by the Tombigbee, and from that point is known as the Mobile River. It is navigable from Mobile to Wetumpka, on the Coosa, some 460 miles. The Tombigbee is navigable to Columbus, and the Black Warrior, one of its chief tributaries, to Tuscaloosa. The Tennessee flows through the northern portion of the state, and the Chattahoochee forms part of its eastern boundary.

Soil.-The southern portion of the state has an alluvial formation, and a light but productive soil well adapted to raising fruits. Cotton and corn are produced, and there are extensive forests of pine in this region. North of this tract is a division known as the cotton belt, mostly prairie land, largely devoted to the culture of cotton. The great mineral region is in the eastern and northeastern part of the state. Gold has been found here in paying quantities for many years. There is also bituminous coal mined in this region as well as other valuable minerals. West of this is a manufacturing district well supplied with water power. In the northern part of the state are rich grazing lands which yield large crops of cereals and fruits.

Vegetation. — In Alabama vegetable products of the temperate and semi-tropical regions thrive. The principal forest trees are oak, hickory, chestnut, cedar, elm, and pine. There are also some dense cane-brakes, which have now for the most part been cleared away, leaving a most fertile soil.

In the southern parts of the state are forests of cyprus, yellow pine, and magnolia. Also the fig and pomegranate, olive, apricot, and orange trees. Grasses, the cereals, and corn, and in the valleys, cotton, are raised in the northern part of the state. In the southwestern part of the state is grown sugar, rice, and some indigo; tobacco is grown to some extent. *Climate.*—The climate of Alabama varies

Climate. — The climate of Alabama varies with the latitude and elevation. The northern counties have a delightful temperate climate, the thermometer in winter seldom falling below 32° Fahrenheit, while the eleva-

# Alabama

tion prevents intense heat in the summer. Some of the river valleys are very unhealthful, and on the other hand there are several resorts for invalids in the state. In the southern part of the state there is a great tendency to malaria and fevers. But for the gulf breezes the heat would be almost unbearable. The water supply is from artesian wells in the southern part of the state, while the northern part is supplied with springs and good wells.

supplied with springs and good wells. Manufactures.— Within the last twenty-five years Alabama has made rapid strides in the establishment of manufacturing industries. There are a number of large saw-mills, grist-mills and leather-dressing establishments, boot and shoe factories, turpentine distilleries, carriage and wagon factories, in operation, employing thousands of men. The manufacture of pig-iron, which can be produced here as cheaply as any place in the U. S., machinery, and cotton goods, has been carried on with remarkable success and several large factories have been established.

Education.— There are four normal schools in the state located at Marion, Florence, Huntsville, and Tuskegee. The State University of Alabama is located at Tuscaloosa. The Agricultural and Mechanical College and the Southern University are located at Auburn and Greensboro respectively. At Mobile there is a blind asylum, and an institute for the deaf, dumb, and blind at Talladega, also an insane asylum at Tuscaloosa. There are about 200 newspapers in the state, 16 of them being dailies. The public school system of Alabama has not developed with the increase in population.

History.— The first settlement in Alabama was made on the Mobile River in 1702 by the French. The city of Mobile was founded in 1712. Alabama was made a state of the Union in 1819 and was one of the seceding states in 1861. The population in 1890 was 1,513,017. The chief towns are Montgomery, the capital, Mobile, and Birmingham.

Mobile, and Birmingham. Governors. — William W. Bibb, 1819-20; Thomas Bibb, 1820-21; Israel Pickens, 1821-25; John Murphy, 1825-29; Gabriel Moore, 1829-31; John Gayle, 1831-35; Clement C. Clay, 1835-37; Arthur P. Bagby, 1837-41; Benjamin Fitzpatrick, 1841-45; Joshua L. Martin, 1845-47; Reuben Chapman, 1847-49; Henry W. Collier, 1849-53; John A. Winston, 1853-57; Andrew B. Moore, 1857-61; John G. Shorter, 1861-63; Thomas H. Watts, 1863-65; Lewis E. Parsons, 1865; Robert M. Patton, 1865-68; William H. Smith, 1868-70; Robert B. Lindsay, 1872; David P. Lewis, 1872-74; George S. Houston, 1874-79; Rufus W. Cobb, 1870-81; Edward A. O'Neal, 1882-84-86; T. Seay, 1886-88-90; T. G. Jones, 1890-94; W. C. Oates, 1894-96; J. F. Johnston, 1896.

Alabama, a river of Alabama, formed by the junction of the Coosa and the Tallapoosa. After a course of 300 miles, it joins the Tombigbee and assumes the name of the Mobile.

Alabama, a vessel built at Birkenhead, Eng land, in 1862, by Messrs. Laird & Sons, for the Confederate Government. She was a

piratical craft, and it is certain that she was forced to deal with her captures precisely as a pirate does, against whom every port is closed; i. e., she first plundered and then burnt them. Her devastations gave rise to the Alabama question, and ultimately cost Great Britain over \$16,000,000. The cruiser was a wooden ship of 1,040 tons' register, barquerigged, with two engines of 350 horse-power each, pierced for 12 guns, besides being able to carry two heavy pivot-guns amidships, and cost in all nearly \$260,000. At Terceira, one of the Azores, she received guns, stores, and coals from another vessel. Captain Semmes then stepped on board, and Aug. 24, 1862, produced his commission, named the vessel the A., hoisted the Confederate flag, and prepared for work. Before September 16 she had destroyed more than her own cost, and for nearly two years after she was the terror of Union merchantmen in every sea. In all, she captured sixty-five vessels, and destroyed property estimated at \$4,000,000. Swift-sailing cruisers scoured the seas in search of the pirate, who, was at length forced, partly from want of stores, to take refuge in the port of Cherbourg, on the coast of Normandy, June 11, 1864. A few days later, the U.S. steamer Kearsarge, commanded by Captain Winslow, also arrived at Cherbourg. June 19 a fight took place outside the port and in less than an hour the A. was sunk. Semmes and others were picked up by an English yacht, the Deerhound.

Not many months after the A. had commenced her destructive career, Mr. Seward, in his capacity of secretary of state, informed the British Government that the U.S. held themselves entitled to damages for the injuries done to American commerce by a vessel fitted out for war in a British port, and would claim them in due time. The idea took claim them in due time. strong hold of the American mind, and at length Great Britain was induced to submit to arbitration the question of her culpability in regard to the escape of the A. A congress met at Geneva Dec. 17, 1871, consisting of rep-resentatives of Great Britain and the U. S., and of three members appointed by the king of Italy, the president of the Swiss Confederation, and the emperor of Brazil. The

decision was given Sept. 15, 1872. It was a dverse to Great Britain, which was ordered to pay to the U. S. the sum of \$16,-145,833. After all awards were made to private claimants about \$8,000,-000 still remained unclaimed.

Alabas'ter, a name applied to a granular variety of

granular variety of finate of lime. It was much used by the ancients for the manufact-



### Alagoas

ure of ointment and perfume boxes, vases, and the like. It has a fine granular texture, is usually of a pure white color, and is so soft that it can be scratched with the nail. It is found in many parts of Europe; in great abundance and of peculiarly excellent quality in Tuscany. From the finer and more compact kinds, vases, clock-stands, statuettes, and other ornamental articles are made, and from inferior kinds the cement known as plaster of Paris. A variety of carbonate of lime, closely resembling alabaster in appearance, is used for similar purposes under the name of Oriental alabaster. It is usually stalagmitic or stalactitic in origin, and is often of a yellowish color. It may be distinguished from true alabaster by being too hard to be scratched with the nail.

Alago'as, a maritime province of Brazil. Area 11,640 sq. mi.; pop. about 400,000. — Algoas, the former capital of the province is about 20 mi. distant from Maceio, to which the seat of government was transferred in 1839. Pop. about 4.000.

Alajuela (à-là-hu-a'là), a town of Central America, capital of the state of Costa Rica. Pop. 12,000.

**Alameda**, Alameda co., Cal., a favorite suburban residence for San Francisco business men. It is situated on the Bay of San Francisco about 8 mi. from the city, with which it is connected by a steam ferry. It is celebrated for its orchards and gardens. Pop. 11,165.

Alamo, Bexar co., Tex., celebrated for the resistance which 145 men under Col. Travis made against Gen. Santa Anna and 5,000 Mexican soldiers, from February 23 to March 6, 1836, in the war of Texan independence. The Alamo was built originally for a mission, but



The Alamo.

was strong euough for a place of defense. except against artillery. It had a surrounding wall of masonry over two and a half feet thick, and eight feet high. The main square was 154 yards long by 54 wide. On the southeast of it was the church, with walls of stone 4 feet thick and about 23 feet high. It was never completed and had no roof. From the northeast corner of the chapel, a wall extended northward 186 feet, thence westward, at right angles to the convent, enclosing the convent yard. The convent was a two-story adobe

building, 191 by 18 feet. It was used as an armory and barracks. The prison was one-story, 115 by 17 feet, and from its southeast corner a diagonal ditch, over which was a strong stockade with an entrance in the center, extended to the church. The whole area enclosed was about three acres, this was supplied with water from two aqueducts. Upon the walls of the Alamo were mounted fourteen guns, three of which were planted upon the walls of the church. The stockade was protected by two pieces, and two more overlooked the gateway and prison; others were placed at various points on the walls. Col. Travis was forced to take refuge in this place, on the above mentioned date, on account of the approach of the Mexican forces under Santa Anna. He had barely time to get a few bushels of corn and about twenty-five head of beeves within the enclosure. He had a very small supply of ammunition. Santa Anna appeared before the walls of the Mission and demanded an unconditional surrender, which was answered with a cannon shot. Within was answered with a cannon shot. the improvised fortress were such men as James Bowie, David Crockett, and J. B. Bonham. They determined not to surrender under any circumstances, nor would they retreat. Santa Anna continued to draw his forces around the walls, and a constant bombardment was kept up, and although nearly 200 shells fell inside the works, not a Texan was killed during the first eight days. The walls withstood the cannonade with little or no harm. The Texans in the meantime utilized their small supply of ammunition by picking off whatever of the Mexican forces fell within the range of their rifles. Santa Anna considered several times the advisability of storming the fortress, but it was not undertaken until the arrival of 1,200 more men and some heavy guns. On March 5, Santa Anna gave the order for the attack, and in four columns they proceeded to the fortress, provided with ladders, crow-bars, and axes. The attacking forces numbered 2,500 men, aided by the cavalry, which was stationed at several points to cut off escape. Early in the morning of the 6th, the attacking forces were ready for the onset. The besieged were also prepared, and at the first assault, made a terrible slaughter with the artillery and rifles, while they re-mained practically unharmed. At first the Mexicans were unable to scale the outer walls, and were repulsed several times, always with terrible loss. Again the stormers returned to the attack, and it was only on account of superior numbers that they at length gained an entrance to the wall. Col. Travis was killed, and the small amount of ammunition made it impossible to keep up the artillery firing. The outer walls were abandoned and the defenders retired to the long barracks and the church. They kept up the firing as well as they could through the windows and loopholes, but the Mexicans, having now gotten control of the Alamo artillery, made short work of destroy-ing the retreats of the defenders. Then followed a sharp hand-to-hand conflict, as the

defenders retired from one room to another. At length crowded into the church, the few remaining men, among whom were David Crockett, made a determined stand and turned the gun which was mounted on the church, against the Mexicans. Their superior numbers, however, soon overcame the remainder of the defenders, and the last of the Texan heroes was slain. In less than an hour after the bugle call to the assault, the Alamo was in the possession of the Mexicans. Six of those who were besieged in the Alamo were spared, three of whom were women, two children, and Col. Travis's negro servant-boy. The Texans were denied the right of burial. Their bodies were piled in layers between wood and dry brush, and set on fire. The loss to the Mexican forces is estimated at 1,600 men. In consequence of the heroic resistance made at this place, the Alamo is known as the "Thermopylae of America." Throughout the struggle for Texan independ-ence, the battle cry was, "Remember the Alamo."

Al'amo, a town of Mexico, state of Sonora, well built, the capital of a mining district. Pop. 12,000.

Aland (o'land) Islands, a numerous group of islands and islets, belonging to Russia, situated in the Baltic Sea, near the mouth of the Gulf of Finland. Area 468 sq. mi. The fortress of Bomarsund was destroyed by an Anglo-French force in August, 1854. The islands were ceded by Sweden to Russia in 1809. Pop. 18,000.

by Sweden to Russia in 1809. Pop. 18,000. Alarcon' Y Mendo'za, Don JUAN RUIZ DE, one of the most distinguished dramatic poets of Spain, born in Mexico about the beginning of the seventeenth century. He came to Europe about 1622, and in 1628 he published a volume containing eight comedies, and in 1634 another containing twelve. One of them called La Verdad Sospechosa (The Truth Suspected), furnished Corneille with the groundwork and greater part of the substance of his Menteur. His Tejador de Segoria (Weaver of Segoria) and Las Paredes Oyen (Walls have Ears) are still performed on the Spanish stage. He died in 1639.

Al'aric 1 (376-410), a famous Visigothic warrior. In 394 Theodosius gave him the command of his Gothic auxiliaries. In 396 he in-vaded and pillaged Greece, from which, when pressed by Stilicho (397), he made a masterly retreat to Illyria. In 400 he invaded Italy, but sustained a defeat from Stilicho at Pollentia (403). A. made a second invasion of Italy, memorable for three sieges of Rome. The first (408) was bought off, but the second (409) resulted in the surrender of the city, and the substitution of Attalus for Honorius. The incapacity of Attalus induced A. to restore Honorius. Rome was besieged for the third time, 410, and sacked for six days. A. intended to invade Sicily and Africa, but dying at Cosenza, he was buried in the bed of the Busento. A. was naturally generous, and it was owing to him that the splendid edifices of Greece and Rome suffered so little damage during his invasions. The most lasting effect

of his inroads on the Western Empire was the establishment of the Visigothic Empire in Spain by the warriors whom he left behind him.

Al'aric II, eighth king of the Visigoths, succeeded his father in A. D. 484. He preferred peace to war, and, though an Arian, granted privileges to the Catholics. In a battle at Vouillé, near Poitiers, the army of A. was defeated, and himself slain (507).

Alaska, formerly Russian America, a territory of the U. S., is a vast tract of country forming the northwest portion of North America. Alaska comprises the whole of North America from 141<sup>o</sup> w. long. to Behring Strait, and also numerous islands along the coast, notably Prince of Wales Island, King George III Archipelago, the Kodiak Islands, and the Aleutian Islands, which stretch seaward from the extremity of the peninsula. From north to south the extreme length of Alaska is about 1,100 miles, and the greatest breadth from east to west is 800 miles. The area of the whole territory is estimated at 514,700 sq. mi.

The numerous islands, creeks, and inlets of Alaska lengthen out its coast line to 7,860 miles, an extent greater than that of the eastern coast line of the U.S. The principal river of Alaska is the Yukon. At a distance of 600 miles from the sea this magnificent river has a width of more than a mile, and has many large tributaries. Its volume is so great that 10 miles out from its principal mouth the water is fresh. A great mountain range ex-tends from British Columbia, in a northwest direction, along the coast of Alaska, the summit being covered with snow and glaciers. The Muir Glacier, the largest in the world, is situated here. Professor John Muir, after whom the glacier is named, was the first to describe it. It is as large as all the Alpine glaciers in one, being 1,200 sq. mi. in area. Where it discharges into the sea, it presents a wall of blue ice exceeding 500 feet in thickness. This river of ice, with its numerous branches. is 150 mi. in length, and varying from one to a dozen miles in width. It is continuously discharging icebergs, small and large, some containing hundreds of tons of ice, the fall of which into the sea casts up spray for hundreds of feet into the air. The Muir Glacier is esti-mated to discharge 77 billion cubic feet of ice in icebergs, and 175 billion cubic feet of water by melting every year. In the interior and to the north the country is mountainous, with great intervening plains.

The northwest coast of this part of America was discovered and explored by a Russian expedition under Behring in 1741; and at subsequent periods settlements were made by the Russians at various places, chiefly for the prosecution of the fur trade. In 1799 the territory was granted to a Russo-American fur company by the Emperor Paul VIII, and in 1839 the charter of the company was renewed. New Archangel was the principal settlement, but the company had about forty stations. They exported annually 25,000 skins of the seal, sea-otter, beaver, etc., besides about 20,000 sea-horse teeth. The privileges of the company expired in 1863; and in 1867 the whole Russian possessions in America were ceded to the U. S. for a money payment of \$7,200,000. The treaty was signed March 30, and ratified June 20, 1867; and on October 9, following, the possession of the country was formally made over to a military force of the U. S. at New Archangel.

The climate on the southwestern coast of Alaska is tolerably mild considering its high latitude. The great warm current of the Pacific, sweeping in a northeasterly circuit from the East India Islands, and corresponding very much in character and effects to the Gulf Stream of the Atlantic, washes its shores; and while it modifies the temperature, also causes an excessive rainfall. At Sitka the mean temperature is 42.9°, and the average rainfall about 80 inches. Alaska will never have any great agricultural value. From the great amount of rain and the want of heat, cereals grow, but will not ripen, and vegetables do not thrive. Native grasses and berries grow plentifully, but the chief wealth of the country is in its vast forests, in its gold and coal mines, in the furs of its wild animals, and in the fish with which its rivers and seas abound. The forests, rising from the coast and covering the mountains to a height of 2,000 feet, consist of a very durable yellow cedar, spruce, larch, and fir of great size, and also cypress and hemlock. The wild animals include the elk, the deer, and various species of bear, and also many fur-bearing animals, such as the wolf and fox, the beaver, ermine, marten, otter, and squirrel. Near the coast and islands there are innumerable furbearing seals, which are caught in great numbers by the settlers; but from the rigor of the climate and the arduous nature of the work, the trapping of the animals of the interior is left to the Indians. The salmon abounds in the rivers, and there are great banks along the shores, the favorite haunt of cod and other fish. About eighty whalers prosecute their fishing off the coast of Alaska. Coal, iron, and gold are the most important minerals, the deposits of which are proving to be very extensive.

The population is very limited, consisting of 8,000 whites, and 15,000 Indians, with some Esquimaux on the northern coast. Sitka is the headquarters of the U. S. authorities. It contains about 1,500 inhabitants, is the residence of a Greek bishop, and has fortifications, magazines, and a magnetic observatory.

A'lava, a hilly province in the north of Spain, one of the three Basque provinces; area 1,207 sq. mi.; covered by branches of the Pyranees, the mountains being clothed with oak, chestnut, and other timber, and the valleys yielding grain, vegetables, and abundance of fruits. There are iron and copper mines, and inexhaustible salt springs. Capital, Vittoria. Pop. 93,538.

Alba, the name of several towns in ancient Italy, the most celebrated of which was Alba Longa, a city of Latium, according to tradition built by Ascanius, the son of Æneas, 300 years before the foundation of Rome, at one time the most powerful city of Latium. In later times its site became covered with villas of wealthy Romans.

Albacete (àl-bà-thã' tã), a town in southern Spain, capital of the province of the same name, 106 mi. n. n. w. of Cartagena, with a considerable trade, both direct and transit, and manufactures of knives, daggers, etc. Pop. 17,-694.—The province has an area of 6,170 sq. mi. and a population of 219,058.

Alban, St., the traditionary proto-martyr of Britain, who flourished in the third century, was, it is said, converted from paganism by a confessor whom he had saved from his persecutors, and refusing to sacrifice to the gods, was executed outside of the city of Verulamium (St. Albans) in 285 or 305.

Albani (àl-bā' nē), FRANCESCO (1578-1660), a famous Italian painter. Among the best known of his compositions are the Sleeping Venus, Diana in the Bath, Danae Reclining, Galatea on the Sea, Europa on the Bull.

Albani, MME. (MARIE EMMA LAJEUNESSE), born in Montreal, Canada, in 1851. She sang in Albany, N. Y., in the Catholic cathedral, and funds were procured to send her to Europe to complete her musical education. She sang in 1870 at Messina, Sicily, and adopted the name of Albina in remembrance of the city of Albany. Mme. Albani has sung in opera in London, Florence, St. Petersburg, and all the principal cities of this country. In 1880, she took part in the historic operatic season at the Chicago Auditorium.

Alba'nia, an extensive region in the s. w. of Turkey in Europe, stretching along the coast of the Adriatic for about 290 mi., and having a breadth varying from about 90 to about 50 mi. Albania has many species of oak, the poplar, hazel, plane, chestnut, cypress, and laurel. The vine flourishes, together with the orange, almond, fig, mulberry, and citron; maize, wheat and barley are cultivated. Its fauna comprises bears, wolves, and chamois; sheep, goats, horses, asses, and mules are plentiful. The chief exports are live stock. wool, hides, timber, oil, salt-fish, cheese, and tobacco. The chief ports are Prevesa, Avlona, and Durazzo. The population, about 1,400,-000, consists chiefly of Albanians, or, as they call themselves, mountaineers, with a certain number of Greeks and Turks. They are only half civilized, are divided into a number of clans, and bloody feuds are still common among them. They belong partly to the Greek, partly to the Roman Catholic Church, but the great majority are Mohammedans. Though their country became a province of the Turkish dominions in the fifteenth century, they still maintain a certain degree of independence, which the Porte has never found it possible to overcome.

'Alba'no, a city and lake in Italy, the former about 15 mi. s. e. of Rome, and on the west border of the lake, amid beautiful scenery, with remarkable remains of ancient structures. Pop. 6,493.—The lake, situated immediately beneath the Alban Hill, is of an oval form, 6 mi. in circumference, surrounded by steep

### Albany

banks of volcanic tufa, 300 or 400 feet high, and discharges its superfluous waters by an artificial tunnel at least 2,000 years old.

Al'bany, the original Celtic name probably at first applied to the whole of Britain, but latterly restricted to the Highlands of Scotland. It gave the title of duke formerly to a prince of the blood-royal of Scotland. Latterly the title has belonged to members of the British royal family.

Al'bany, capital of the state of New York, 145 miles north of New York City. The Erie Canal and the numerous railway lines centering here from all directions greatly contribute to the growth and prosperity of the city, which carries on an extensive trade. It is a great mart for timber, and has foundries, breweries, tanneries, etc. Albany was settled by the Dutch in 1610-14, and the older houses are in the Dutch style, with the gable ends to the streets. There is a university, an observatory, and a state library with 90,000 volumes. The principal public edifices are the capitol, or state-house, the state-hall for the public offices, a state arsenal, and numerous religious edifices. Pop. 120,000.

Al'batross, a large marine swimming bird of several species, of which the wandering albatross is the best known. The bill is straight and strong, the upper mandible hooked at the point and the lower one truncated; there are three webbed toes on each foot. The upper part of the body is of a grayish brown, and the



Wandering Albatross.

belly white. It is the largest sea-bird known, some measuring 17<sup>4</sup> feet from tip to tip of their expanded wings. They abound at the Cape of Good Hope and in other parts of the southern seas, and in Behring's Straits, and have been known to accompany ships for whole days without ever resting on the waves. The albatross is met with at great distances from the land, settling down on the waves at night to sleep. It is exceedingly voracious whenever food is abundant, gorging to such a degree as to be unable to fly or swim. It feeds on fish, carrion, fish-spawn, oceanic mollusca, and other small marine animals. Its voice is a harsh, disagreeable cry. Its eggs are larger than those of a goose. It lays but one egg. on the ground, where it makes a kind of nest by scraping the earth around it. The young is entirely white, and covered with a woolly down, which is very beautiful.

Albay (al-bi'), a province, town, bay, and volcano in the southeast part of the island of Luçon, one of the Phillippines. The province is mountainous but fertile; the town regularly built, with a population of 13,115; the bay capacious, secure, and almost landlocked; and the volcano, which is always in activity, forms a conspicuous landmark.

Albert, king of Saxony, b. 1828, succeeded to the throne 1873. He married Caroline, Princess Vasa, of Sweden in 1853. He supported Prussia in the war with France, 1870-71, and was made a field-marshal in the German Army.

Albert Edward. See Wales, Prince of.

Al'bert, FRANCIS-AUGUSTUS-CHARLES-EM-MANUEL, Prince of Saxe-Coburg-Gotha, late Consort of Queen Victoria, of England, was the second son of Ernest, Duke of Saxe-Coburg-Gotha, b. 1819. In 1840 he became the husband of the queen of England. The name of Prince A. will ever be remembered as that of a true friend of progress and the people. He was an earnest promoter of science and art, and was the first to suggest the International Exhibition of 1851. The manner in which he filled his somewhat anomalous position as the Queen's consort was marked by the greatest sagacity and tact. His death, Dec. 14, 1861, caused the most profound grief throughout the world. A collection of the speeches of Prince A. was published soon after his death.

Alber'ta, one of the districts of the Northwest Territories of Canada, having Assiniboia and Saskatchewan on the east, British Columbia on the west, the U. S. on the south, and Athabasca on the north. Area 106,500 sq. mi.; pop. 15,533. It is a fertile grassy region with trees in the river valleys; coal is abundant. Capital, Calgary.

Albert Nyan'za, a lake of Africa, one of the head-waters of the Nile. It abounds with fish, and its shores are infested with crocodiles and hippopotami. It receives the Victoria Nile from the Victoria Nyanza, and the White Nile issues from its northern extremity.

Albigenses (al-bi-jen'sēz), a sect which spread widely in the south of France and elsewhere about the twelfth century, and which differed in doctrine and practise from the Roman Catholic Church, by which they were subjected to severe persecution. They are said to have been so named from the district Albi, where, and about Toulouse, Narbonne, etc., they were numerous. A crusade was begun against them and Count Raymond VI of Toulouse, for tolerating them, in 1209, the army of the cross being called together by Pope Innocent III. Simon de Montfort, the military leader of the crusade, was severe toward other places in the territory of Raymond and his allies. When hundreds of thousands had fallen on both sides. a peace was made in 1229, by which Raymond was obliged to cede Narbonne with other territories to Louis IX, and make his son-in-law, a

brother of Louis, his heir. The heretics were now delivered up to the proselytizing Dominicans, and to the Inquisition, and they disappeared after the middle of the thirteenth century.

Albina, Multnomah co., Ore. Pop. 1890, 5,129.

Albinos (al-bi'noz), the name given to those persons from whose skin, hair, and eyes, in consequence of some defect in their organization, the dark coloring matter is absent. The skin of albinos, therefore, whether they belong to the white, Indian, or negro races, is of a uniform pale milky color, their hair is white, while the iris of their eyes is pale rose color, and the pupil intensely red, the absence of the dark pigment allowing the multitude of bloodvessels in these parts of the eye to be seen. For the same reason their eyes are not well suited to endure the bright light of day, and they see best in shade or by moonlight. peculiarity of albinism is always born with the individual, and is not confined to the human race, having been observed also in horses, rabbits. rats, mice, etc., birds (white crows or black-birds are not particularly uncommon), and fishes.

**Al'bion**, the earliest name by which the island of Great Britain was known, employed by Aristotle, and in poetry still used for Great Britain. The same word as *Albany*, *Albyn*.

Britain. The same word as Albany, Albyn. Albuera (àl-by-à'rà), a village of Spain, in Estremadura, 12 mi. s. s. e. of Badajoz. A battle was fought here, May 10, 1811, between the army of Marshal Beresford (30,000) and that of Marshal Soult (25,000), when the latter was obliged to retreat to Seville, leaving Badajoz to fall into the hands of the allies.

Albu'men (or Albumin), a substance, or rather, group of substances, so named from the Latin for the white of an egg, which is one of its most abundant known forms. It may be taken as the type of the protein compounds or the nitrogenous class of food stuffs. One variety enters largely into the composition of the animal fluids and solids, is coagulable by heat at and above 160°, and is composed of carbon, hydrogen, nitrogen, and oxygen, with a little sulphur. It abounds in the serum of the blood, the vitreous and crystalline hu-mors of the eye, the fluid of dropsy, the substance called coagulable lymph, in nutritive matters, the juice of flesh, etc. The blood contains about 7 per cent. of albumen. Another variety called vegetable albumen exists in most vegetable juices and many seeds, and has nearly the same composition and proper-ties as egg albumen. When albumen coagulates in any fluid it readily encloses any substances that may be suspended in the fluid. Hence it is used to clarify syrupy liq-In cookery white of eggs is employed uors. for clarifying, but in large operations like sugar-refining the serum of blood is used. From its being coagulable by various salts, and especially by corrosive sublimate, with which it forms an insoluble compound, white of egg is a convenient antidote in cases of poisoning by that substance. With lime it poisoning by that substance. forms a cement to mend broken ware.

In botany the name albumen is given to the farinaceous matter which surrounds the embryo, the term in this case having no reference to chemical composition. It constitutes the meat of the cocoanut, the flour or meal of cereals, the roasted part of coffee, etc.

Albuquerque (àl-bu-kerk'à), ALFONSO DE (1452-1515), an eminent Portuguese admiral. His career was extremely successful, he having extended the Portuguese power over Malabar, Ceylon, the Sunda Islands, and the Peninsula of Malacca, and made the Portuguese name respected by all the nations and princes of India.

Albuquerque, Bernalillo co., N. M., on Rio Grande River, 528 mi. s. of Denver. Railroads, Atlantic & Pacific and A. T. & S. F. Industries—two flouring mills, iron foundry, ice factory, stamp mill, and a wool-scouring plant, and railroad machine shops. Surrounding country, agricultural and mineral. The town was first settled in 1880 and became a city in 1892. Pop. est., 1897, 12,000.

**Albur' num,** the soft white substance which, in trees, is found between the liber or inner bark and the wood, and, in progress of time acquiring solidity, becomes itself the wood. A new layer of wood, or rather of alburnum, is added annually to the tree in every part just under the bark.

Alcæ'us, one of the greatest Grecian lyric poets, was born at Mitylene, in Lesbos, and flourished there at the close of the seventh and beginning of the sixth centuries B. C.; but of his life little is known. A strong manly enthusiasm for freedom and justice pervades his lyrics, of which only a few fragments are left. He wrote in the Æolic dialect, and was the inventor of a meter that bears his name, which Horace has employed in many of his odes.

Alcala' de Henares (en-ä'res), a beautiful city of Spain, 16 mi. e. n. e. of Madrid. It has an imposing appearance when seen from some distance, but on nearer inspection is found to be in a state of decay. There was formerly a university here, at one time attended by 10,000 students; but in 1830 it was removed with its library to Madrid. Cervantes was born here. Pop. 12,317.

Alces' tis, in Greek mythology, wife of Admetus, king of Thessaly. Her husband was ill, and, according to an oracle, would die unless some one made a vow to meet death in his stead. This was secretly done by Alcestis, and Admetus recovered. After her decease Hercules brought her back from the infernal regions. See *Mythology*.

Al'chemy (or Alchymy), the art which in former times occupied the place of, and paved the way for, the modern science of chemistry (as astrology did for astronomy), but whose aims were not scientific, being confined solely to the discovery of the means of indefinitely prolonging human life, and of transmuting the baser metals into gold and silver. Among the alchemists it was generally thought necessary to find a substance which, containing the original principle of all matter, should possess the

### Alcibiades

power of dissolving all substances into their elements. This general solvent, which at the same time was to possess the power of remov-ing all the seeds of disease out of the human body and renewing life, was called the philosopher's stone, and its pretended possessors were known as adepts. Alchemy flourished chiefly in the Middle Ages. Many of the monks de-voted themselves to alchemy, although they were latterly prohibited from studying it by the popes. But there was one even among these, John XXII, who was fond of alchemy. Raymond Lully, or Lullius, a famous alche-mist of the thirteenth and fourteenth centuries, is said to have changed for King Edward I a mass of 50,000 lbs. of quicksilver into gold, of which the first rose-nobles were coined. Among other alchemists may be mentioned Parcelsus and Basilius Valentinus. When more rational principles of chemistry and philosophy began to be diffused and to shed light on chemical phenomena, the rage for

alchemy gradually decreased. Alcibi ades (dez) (B. c. 450-404), an Athenian of high family and of great abilities, but of no principle, b. at Athens, being the son of Cleinias, and a relative of Pericles. In youth he was remarkable for the dissoluteness of his manners. He came under the influence of Socrates. After the death of Cleon he attained a political ascendency which left him no rival but Nicias. He played an important part in the Peloponnesian war. In 415 he advocated the expedition against Sicily, and was chosen one of the leaders, but before the expedition sailed he was charged with profaning and divulging the Eleusinian Mysteries. Rather than stand his trial he went over to Sparta, divulged the plans of the Athenians, and assisted the Spartans to defeat them. He soon left Sparta and took refuge with the Persian satrap Tissaphernes. He began to intrigue for his return to Athens, offering to bring Tissaphernes over to the Athenian al-liance, and latterly he was recalled and his banishment canceled. He, however, remained abroad in command of the Athenian forces. and took Chalcedon and Byzantium. In B. C. 407 he returned to Athens, but in 406, he was deprived of his command. He once more went over to the refuge of the satrap Pharnabazus of Phrygia, and here he was assassinated.

Al'cohol, the purely spirituous or intoxicating part of all liquids that have undergone vinous fermentation, extracted by distillation—a limpid colorless liquid, of an agreeable smell and a strong pungent taste. When brandy, whisky, and other spirituous liquors, themselves distilled from cruder materials, are again distilled, highly volatile alcohol is the first product to pass off. Charcoal and carbonate of soda put in the brandy or other liquor, partly retain the fusel-oil and acetic acid it contains. The product thus obtained by distillation is called *rectified spirits* or *spirits* of wine, and contains from 55 to 85 per cent. of alcohol, the rest being water. By distilling rectified spirits over carbonate of potassium,

powdered quicklime, or chloride of calcium, the greater part of the water is retained, and nearly pure alcohol passes over. It is only, however, by very prolonged digestion with desiccating agents and subsequent distillation that the last traces of water can be removed. The specific gravity of alcohol varies with its purity, decreasing as the quantity of water it contains decreases. By simple distillation the specific gravity of alcohol can scarcely be reduced below .825 at 60° Fahr.; by rectification over chloride of calcium it may be reduced to .794; as it usually occurs it is about .820. Alcohol is composed of carbon, hydrogen, and oxygen, in the proportions of 2 to 6 to 1 respectively. Under a barometric pressure of 29.5 inches it boils at 173° Fahr.; in the exhausted receiver of an air-pump it boils at ordinary temperatures. Its very low freezingpoint renders it valuable for use in thermometers for very low temperatures. Alcohol is extremely inflammable, and burns with a paleblue flame, scarcely visible in bright daylight. It occasions no carbonaceous deposit upon substances held over it, and the products of its combustion are carbonic acid and water. The steady and uniform heat which it gives during combustion makes it a valuable material for lamps. It dissolves the vegetable acids, the volatile oils, the resins, tan, and extractive matter, and many of the soaps; the greater number of the fixed oils are taken up by it insmall quantities only, but some are dissolved largely. When alcohol is submitted to distillation with certain acids a peculiar compound is formed, called ether. It is alcohol which gives all intoxicating liquors the property whence they are so called. Alcohol acts strongly on the nervous system, and though in small doses it is stimulating and exhilarating, in large doses it acts as a poison. In medicine it is often of great service.

The name alcohol is also applied in chemistry to a large group of compounds of carbon, hydrogen, and oxygen, whose chemical properties are analogous to that of common or ethylic alcohol.

Alco'ran. See Koran.

Alcott, AMOS BRONSON (1799-1888), born in Wolcott, Conn. In 1828 he went to Boston and organized a school on a novel plan. Later Mr. Alcott went to Concord, Mass., where he studied natural theology, reform in education and civil and social institutions, and began to lecture. In 1842 he went to England to confer with educational and social reformers. On his return to America he again settled in Concord. Among his publications are, Tablets (1868); Concord Days (1872); Table Talk (1877); and Sonnets and Canzonets (1877).

Alcott, LOUISA MAY (1832–1888), author, born in Germantown, Penn. She was the daughter of Amos Bronson Alcott. For a number of years she wrote for periodicals, while she was occupied as a school-teacher. In 1862 she went as a volunteer nurse in military hospitals. In 1866 Miss Alcott visited Europe, and on her return wrote *Little Women*, a book that at once established her popularity as a writer.



Some of her other publications have been almost equally popular. Alcuin (alk'win) (735-804), a learned Eng-

lishman, the confidant, instructor, and adviser of Charles the Great (Charlemagne). Charlemagne became acquainted with him at Parma, invited him in 782 to his court, and made use of his services in his endeavors to civilize his subjects. Charlemagne established at his court a school, called Schola Palatina, or the Palace School. Most of the schools in France were either founded or improved by him; thus he founded the school in the abbey of St. Martin of Tours, in 796. Alcuin left the court in 801, and retired to the abbey of St. Martin of Tours, but kept up a constant correspondence with Charles to his death. He left works on theology, philosophy, rhetoric, also poems and letters, all of which have been published.

Alden, JOHN, one of the Pilgrim Fathers landing in Massachusetts in 1620. The romantic incident of his courtship of Priscilla as the emissary of Miles Standish has been preserved in Longfellow's verse. He died 1687.

Alder (al'dér), a genus of plants, of the birch order, consisting of trees and shrubs inhabiting the temperate and colder regions of the globe. Common alder is a tree which grows in wet situations in the U.S., Europe, and Asia. Its wood, light and soft and of a



reddish color, is used for a variety of purposes, and is well adapted for work which is to be kept constantly in water. The roots and knots furnish a beautifully-veined wood, well suited for cabinet work. The charcoal made from the wood is used in manufacturing powder.. The bark is used in tanning and leather dressing, and by fishermen for staining their nets. This and the young twigs are sometimes employed in dyeing, and yield different shades of yellow and red. With the addition of copperas it yields a black dye.

Al derney, an island belonging to Britain off the coast of Normandy, 10 mi. due west of Cape La Hogue, and 60 from the nearest point of England, the most northerly of the Channel Islands, between 3 and 4 miles long, and about 14 broad. About a third of the island is occupied by grass lands; and the Alderney cows, a small-sized but handsome breed, are famous for the richness of their milk. Climate is mild and healthy. The *Race of Alderney*, the strait between the coast of France and this island. Pop. 2,039.

Aldershot (al'der), a town and military station in England. The *camp* was originated in 1854 by the purchase by government of a tract of moorland known as Aldershot Heath, on the confines of Surrey, Hampshire, and Berkshire. Pop. (including military) 25,595.

Al'dine Editions, the name given to the works which proceeded from the press of Aldus Manutius and his family at Venice (1400-1597). They have gained the respect of scholars and the attention of book-collectors. Many of them are the first printed editions of Greek and Latin classics. Others are texts of the modern Italian authors. These editions are of importance in the history of printing. Aldus had nine kinds of Greek type, and fourteen kinds of Latin type.

Aldrich, NELSON WILMARTH, b. in R. I., 1841; was a member of the assembly, 1875-76, in the latter year was a speaker in the House of Representatives. He was elected to Congress in 1878 and 1880. In 1881 he was elected to the U. S. Senate as a Republican to succeed General Burnside, and was again elected in 1886.

Aid'rich,  $T \Pi O M AS$  BAILEY, an American poet and writer of prose tales, mostly humorous, born in 1836, was a short time in a mercantile house, but soon adopted literature as a profession, and was for a time editor of the Atlantic Monthly. He has written in verse: The Bells; Ballad of Baby Bell; Pampinea and other Poems; Cloth of Gold and other Poems; Flower and Thorn; in prose, Daisy's Necklace; Story of a Bad Boy; Marjory Daw; Prudence Palfrey, etc.

Aldridge, IRA (1804-1867), a negro actor, born at Belair, Md., died in Lodez, Poland. He was educated for a preacher, but united with an amateur dramatic company of his race, where he showed marked ability. His dramatic aspirations were interrupted by friends, and he went to England to complete a ministerial education. But in London the youth made his début at the Royalty theater as Othello, the Moor of Venice, and met with success. Later he appeared at Belfast, Ireland. In 1833 Aldridge appeared at Covent Garden theater in London, and in 1848 at the Surrey theater. He played for three years in Germany, and in 1857 visited Sweden. He re ceived several honors in Europe.

Alecto, in Greek mythology, one of the Furies.

Alembert (à-làm-bār), JEAN DE ROND D' (1717-1783), a French mathematician and philosopher. He was the illegitimate son of Madame de Tencin. His parents never publicly acknowledged him, but his father settled upon him an income of 1,200 livres. He entered the College Mazarin at the age of twelve, and studied mathematics with success. Having left college he studied law and became an advo-

4

cate, but did not cease to occupy himself with mathematics. A pamphlet on the motion of solid bodies in a fluid, and another on the integral calculus, which he laid before the Academy of Sciences in 1739 and 1740, showed him in so favorable a light that the Academy received him in 1741 into the number of its members. He published his famous work on dynamics, Traité de Dynamique (1743); and that on fluids, Iraité des Fluides. He also took a part in the investigations which completed the discoveries of Newton respecting the motion of the heavenly bodies. He took part in the celebrated Encyclopédie for which he wrote the Discours Préliminaire, and almost all the mathematical articles. He received an invitation from the Russian empress Catherine II to go to St. Petersburg, and Frederick the Great invited him to Berlin, but in vain. From Frederick, however, he accepted a pension. There was an intimate friendship between him and Voltaire.

Alemtejo (å-län-tä'zhō), the largest province of Portugal, and the most southern except Algarve. Area 19,255 sq. mi.; pop. 367,169. The capital is Evora.

Alençon (à-làn-sôn), a town of France, capital of department Orue, on the right bank of the Sarthe, 105 mi. w. by s. of Paris; has a fine Gothic church (fifteenth century), and interesting remains of the old castle of the dukes of d'Alençon. Alençon was long famed for its point-lace, called "point d'Alençon." Fine rock-crystal, yielding the so-called "diamants d'Alençon," is found in the neighboring granite quarries. Pop. 17,237.—ALENÇON, a dukedom, became united with the crown in 1221. The first duke of the name lost his life at the battle of Agincourt in 1415; another, called Charles IV, married the celebrated Margaret of Valois, sister of Francis I.

Alep'po, a city of Asiatic Turkey, in north Syria, 195 mi. n. n. e. of Damascus. Previous to 1822 Aleppo contained about 100 mosques, but in that year an earthquake laid the greater part of them in ruins, and destroyed nearly the whole city. The aqueduct built by the Romans is the oldest monument of the town. It has a trade in wool, cotton, silk, wax, skins, soap, tobacco, etc. By the Greeks and Romans it was called *Beræa*. It was conquered by the Arabs in 638, and its original name *Chalybon* was then turned into *Haleb*, whence the Italian form *Aleppo*. Its population is now estimated at over 100,000, of whom perhaps 25,000 are Christians. The language generally spoken is Arabic.

Alessan' dria, a town and fortress in north Italy, capital of the province of the same name; was built in 1168 by the Cremonese and Milanese, and was named in honor of Pope Alexander III, who made it a bishop's see. It has a cathedral, important manufactures of linen, woolen, and silk goods, and an active trade. Pop. 30,761.

Aletsch-glacier, the greatest glacier in Switzerland, canton Vaud, a prolongation of the immense mass of glaciers connected with the Jungfrau, the Aletschhorn (14,000 ft.), and other peaks; about fifteen miles long.

Aleu'tian Islands, a chain of about eighty small islands belonging to the U.S. See Alaska.

Alexander the Great, king of Macedon (356-323 B. C.), the greatest character in history before the Christian era. In early youth Alexander gave evidence of invincible courage, wonderful strength and endurance, and boundless ambition. At the age of 13 he became a pupil of Aristotle. During the lifetime of his father, Philip of Macedon, he shared in the wars for the supremacy of Macedon over the neighboring states of Greece. On the assassination of his father (336), Alexander came to the throne, at the age of twenty. He put to death several of the murderers of his father, and the latter's second wife and her infant son. The conditions under which Alexander came to the throne were far from He at once began a series of favorable. conquests which filled his reign of a little more than twelve years. The first two years were occupied in subduing the revolting cities of Greece and hostile tribes beyond the northern frontier of Macedonia. It was reported that Alexander had been slain, and a considerable revolt against the Macedonian yoke was begun anew in Greece, with Athens and Thebes as its center. Alexander appeared be-fore the latter city. The allies of Thebes, including Athens, deserted her and the city was taken by storm. The famous city was totally destroyed, the house of the poet Pindar alone being spared. The remaining states of Greece were pardoned.

Alexander set out in the spring of 334 for the conquest of the Persian Empire. With an army of 35,00 he crossed the Hellespont, and at the Granicus he totally defeated a Persian force, thereby opening the gate to all Asia Minor. The next year (333) the invading force met a vast Persian army numbering 600,000 on the plain of Issus. The Persians were again routed. Alexander next turned his attention to Phœnicia. The whole of Syria and Phœnicia submitted to him excepting only the famous city of Tyre, which was taken after a siege of seven months (332). The population of 8,000 was ex-terminated. The capture of Tyre is considered the greatest of Alexander's military operations. The next conquest was that of Egypt. At one of the mouths of the Nile the conqueror founded the city of Alexandria, which became so important a factor in the commerce of the Mediterranean. He next proceeded to the famous temple of Zeus Ammon in the Libyan desert. Alexander now turned his army eastward, to complete his overthrow of the Persian Empire. At Arbela, he met the army of the Persians, numbering more than 1,000,000, and fought one of the decisive battles of the world (331). With his army of 47,000 Alexander routed the Persians, and King Darius III met his death. He entered Babylon and Susa, taking in the latter city the royal treasure of silver and gold. Alexander was now regarded by himself and by the Persians as the successor of Darius. The vio-

### Alexander

torious army was next led northward for the subjugation of various tribes about the Caspian Sea, and thence across the Hindu Kush into Bactria and Sogdiana (329-328). In 327 Alexander led his army to India, where all the na-tive princes submitted except Porus, a powerful king north of the Indus, who was defeated. Alexander rediscovered the sea-route from the Indus to the Euphrates via the Indian Ocean, an achievement of great importance for the commerce of India. He made Babylon the capital of his vast empire. By means of colonies and intermarriage the peoples of Europe and Asia were to be fused into a single great nation, having common laws, language, and ruler. He himself married a daughter of King Darius, and 10,000 of his soldiers took Asiatic wives. In the midst of his vast projects Alexander was seized by a fever and died at Babylon. Of the generals among whom his vast domain was divided, the most famous was Ptolemy, who founded in Egypt the line of rulers of that name.

Alexander's title to greatness lies in his military achievements. His insatiate vanity and unchecked excesses are a serious blemish. His uncontrolled passion led him to commit deeds, such as the murder of his dearest friend, Clitus, which he bitterly repented. He never asked his soldiers to do what he would not do himself. He was a man of fine tastes and a liberal patron of art, philosophy, and literature. The effects of his conquests were, to end the struggle between Greece and Persia, to spread Hellenic civilization over Egypt and western Asia, while to the Greeks came the wealth and the vices of the Orient.

The story of Alexander's life and conquests is told in many ancient annals, and in the romances and legends of many nations.

Alexander, the name of eight popes, the earliest of whom, Alexander I, is said to have reigned from 109 to 119. The most famous is ALEXANDER VI (Borgia), (1431-1503), who was born at Valencia, in Spain. When he was only twenty-five years of age his uncle, Pope Calixtus III, made him a cardinal, and shortly afterward appointed him to the dignified and lucrative office of vice-chancellor. By bribery he prepared his way to the papal throne, which he attained in 1492, after the death of Innocent VIII. Both the authority and revenues of the popes being at this time much impaired, he set himself to reduce the power of the Italian princes, and seized upon their possessions for the benefit of his own family. His policy was faithless and base. He sold indulgences, and set aside, in favor of himself, the wills of several cardinals. His excesses roused against him the powerful eloquence of Savonarola, who, by pen and pul-pit, urged his deposition, but had to meet his death at the stake in 1498. His son Cesare Borgia, and his daughter, Lucrezia, are equally notorious with himself.

Alexander, the name of three Scottish kings. ALEXANDER I, a son of Malcolm Canmore and Margaret of England. He was a great benefactor of the church and a firm vindicator of the national independence. ALEXANDER II (1198-1248) succeeded his father, William the Lion, in 1214. Alexander died at Kerrera, an island opposite Oban, when on an expedition in which he hoped to wrest the Hebrides from Norway. He was succeeded by his son, ALEX-ANDER III, a boy of eight, who, in 1251, married Margaret, eldest daughter of Henry III, of England. He brought the Hebrides under his sway in a few years after the defeat of the Norse King Haco at Largs, in 1263. Alexander was strenuous in asserting the independence both of the Scottish kingdom and the Scottish church against England. He died in 1285. Under him Scotland enjoyed greater prosperity than for generations afterward.

prosperity than for generations afterward. Alexander I (1777-1825), emperor of Russia, son of Paul I and Maria, daughter of Prince Eugene of Würtemberg. On the assassination of his father, in 1801, Alexander ascended the throne, and concluded peace with Great Britain, against which his predecessor had declared war. In 1803 he offered his services as mediator between England and France, and two years later a convention was entered into between Russia, England, Austria, and Sweden for the purpose of resisting the encroachments of France on the territories of independent states. He was present at the battle of Austerlitz (1805), when the combined armies of states. Russia and Austria were defeated by Napoleon. In the succeeding campaign the Russians were again beaten at Éylau and Friedland (1807), the result of which was the treaty at Tilsit. The Russian emperor identified himself with the Napoleonic schemes, and obtained possession The of Finland and territory on the Danube. French alliance was too oppressive, and his having separated himself from Napoleon led to the French invasion of 1812. In 1813 he published a manifesto which served as the basis of the coalition of the other European powers against France, which was followed by the capture of Paris (in 1814), the abdication of Napoleon and the restoration of the Bourbons, and the utter overthrow of Napoleon the following year. After Waterloo, Alexander, accompanied by the emperor of Austria and the king of Prussia, made his second entrance into Paris, where they concluded the treaty known as the Holy Alliance. The remaining part of his reign was chiefly taken up in measures of internal reform, including the gradual abolition of serfdom, and the promotion of education, agriculture, commerce, and manufactures, as well as literature and the fine arts.

Alexander II (1818–1881), emperor of Russia, succeeded his father Nicholas in 1855, before the end of the Crimean war. After peace was concluded the new emperor set about effecting the emancipation of the serfs in 1861, a measure which gave freedom, on certain conditions, to 22,000,000 human beings. Under him, too, representative assemblies were introduced, and he did much to improve education, and to reorganize the judicial system. During his reign the Russian dominions in Central Asia were extended, a piece of territory south of the Caucasus, formerly belong-

## Alexander

ing to Turkey, was acquired, and a part of Bessarabia, belonging since the Crimean war to Turkey in Europe, but previously to Russia, was restored to the latter power. The latter additions resulted from the Russo-Turkish war of 1877-78. He was killed by an explosive missile flung at him by a Nihilist in a street in St. Petersburg, March 13, 1881. He was succeeded by his second son, Alexander III (1845-1894), his eldest son having died in youth. His only daughter is the wife of the Duke of Edinburgh.

Alexander, ARCHIBALD (1772-1851), born in Virginia. He became a Presbyterian minister, and in 1812 head of the theological seminary at Princeton. He published several theological treatises.

Alexander, STEPHEN (1806-1883), astronomer, b. in Schenectady, N. Y.; d. at Princeton, N. J. From 1845 to 1878 he occupied the professorships of mathematics and of astronomy and mechanics at Princeton. In 1860 he conducted an expedition to Labrador for the purpose of observing a solar eclipse.

Alexander, WILLIAM (1726–1783), called "Lord Stirling," soldier, born in New York City. In 1757 he prosecuted his claim to the earldom of Stirling before the British House of Lords, but without success. He became surveyor-general and member of the provin-cial council. At the beginning of the Revolution he joined the colonial army, 1775, as colonel of the battalion of East Jersey, captured an armed British transport, for which exploit Congress appointed him brigadier-general. At the battle of Long Island, Aug. 26, 1776, he was taken prisoner. Within the same year he was exchanged, and in February, 1777, was promoted a major-general. When Gen. Charles Lee marched to Philadelphia, in December, 1776, Alexander remained in command at New York. At Trenton, N. J., he captured a Hessian regiment. On June 24, 1777, at Metuchen his division was defeated. He fought creditably at Brandywine, Germantown, and Monmouth. In 1779 he surprised a British force at Paulus Hook, N. J. In 1781 he was in command at Albany. Alexander was one of the founders of King's College (now Columbia), and became its first president.

Alexander Nevskoi (1219-1263), a Russian hero and saint, son of the Grand-duke Jaroslav. He fought against assaults of the Mongols, the Danes, Swedes, and knights of the Teutonic order. He gained a splendid victory, on the Neva, over the Swedes. His countrymen commemorated him in popular songs, and raised him to the dignity of a saint. Peter the Great built a splendid monastery at St. Petersburg in his honor, and in memory of him established the order of Alexander Nevskoi.

Alexander Seve'rus (A. D. 205-235), a Roman emperor. He was raised to the imperial dignity in 222 A. D. by the pratorian guards, after they had put his cousin, the emperor Heliogabalus, to death. He governed ably both in peace and war; and also occupied himself in poetry, philosophy, and literature.

# Alexandria

In 232 he defeated the Persians under Artaxerxes, who wished to drive the Romans from Asia. When on an expedition into Gaul to repress an incursion of the Germans, he was murdered with his mother in an insurrection of his troops, headed by the brutal Maximin, who succeeded him as emperor.

Alexan' dria, an ancient city and seaport in Egypt, at the northwest angle of the Nile delta, on a ridge of land between the sea and Lake Mareotis. Ancient Alexandria was founded by, and named in honor of, Alexander the Great, in B. C. 332, and was long a great and splendid city, the center of commerce between the East and West, as well as of Greek learning and civilization, with a population at one time of perhaps 1,000,000. It was especially celebrated for its great library, and also for its famous lighthouse, one of the wonders of the world, standing upon the little island of Pharos, which was connected with the city by a mole. Under Roman rule it was the second city of the empire, and when Constantinople became the capital of the East it still remained the chief center of trade; but it received a blow from which it never recovered when captured by Amru, general of Caliph Omar in 641, after a siege of fourteen months. Its ruin was finally completed by the discovery of the passage to India by the Cape of Good Hope, which opened up a new route for the Asiatic trade. See Alexandrian Library, Alexandrian School. Modern Alexandria stands partly on what was formerly the island of Pharos, partly on the peninsula which now connects it with the mainland and has been formed by the accumulation of soil, and partly on the mainland. The streets in the Turkish quarter are narrow, dirty, and irregular; in the foreign quarter they are regular and wide, and it is here the finest houses are situated, and where are the principal shops and hotels, banks, offices of companies, etc.; this part of the city being also supplied with gas, and with water brought by the Mahmudieh Canal from the western branch of the Nile. Alexandria is connected by railway with Cairo, Rosetta, and Suez. A little to the south of the city are the catacombs which now serve as a quarry. Another relic of antiquity is Pompey's Pillar, 98 ft. 9 in. high. Alexandria has two ports, on the east and west respectively of the isthmus of the Pharos peninsula, the latter having a breakwater over 3,000 yards in length, with fine quays and suitable railway and other accommodation. The trade of Alexandria is large and varied, the exports being cotton, beans, peas, rice, wheat, etc.; the imports chiefly manufac-tured goods. At the beginning of the century Alexandria was an insignificant place of 5,000 or 6,000 inhabitants. The origin of its more recent career of prosperity it owes to Moham-med Ali. In 1882 the insurrection of Arabi Pasha and the massacre of Europeans led to the intervention of the British, and the bombardment of the forts by the British fleet, in July. When the British entered the city they found the finest parts of it sacked and in

flames, but the damage is being repaired.

Pop. 227,064. Alexandria, a town and port of Virginia, on the right bank of the Potomac, 7 miles south of Washington, with straight and spacious streets: carries on a considerable trade, chiefly in flour. Pop. 15,230.

Alexandrian Library, the largest and most famous of all the ancient collections of books, founded by Ptolemy Soter, king of Egypt, and greatly enlarged by succeeding Ptolemies. At its most flourishing period it is said to have numbered 700,000 volumes, accommodated in two different buildings, one of them being the Serapeion, or temple of Jupiter Serapis. The other collection was burned during Julius Cæsar's seige of the city, but the Serapeion library existed to the time of the emperor Theodosius the Great, when, at the general destruction of the heathen temples, the splendid temple of Jupiter Serapis was gutted (A. D. 391) by a fanatical crowd of Christians, and its literary treasures destroyed or scattered. A library was again accumulated, but was burned by the Arabs when they captured the city under the Caliph Omar in 641. Amru, the captain of the caliph's army, would have been willing to spare the library, but Omar is said to have disposed of the matter in the famous words : "If these writings of the Greeks agree with the Koran they are useless, and need not be preserved; if they disagree they are perni-cious, and ought to be destroyed."

Alexandrian School (or Age), the school or period of Greek literature and learning that existed at Alexandria in Egypt during the three hundred years that the rule of the Ptolemies lasted (323-30 B. C.), and continued under the Roman supremacy. Ptolemy Soter founded the famous library of Alexandria and his son, Philadelphus, established a kind of academy of sciences and arts. Many scholars and men of genius were thus attracted to Alexandria, and a period of literary activity set in, which made Alexandria for long the focus and center of Greek culture and intellectual effort. Among the grammarians and critics, were Zenodotus, Eratosthenes, Aristophanes, Aristarchus, and Zoilus, proverbial as a captious critic. Their merit is to have collected, edited, and preserved the existing monuments of Greek literature. To the poets belong Apollonius, Lycophron, Aratus, Nicander, Euphorion, Callimachus, Theocritus, Philetas, etc. Among those who pursued mathematics, physics, and astronomy, was Euclid, the father of scientific geometry; Archimedes, great in physics and mechanics; Apollonius of Perga, whose work on conic sec-tions still exists; Nicomachus, the first scientific arithmetician; and (under the Romans) the astronomer and geographer Ptolemy. Alexandria also was distinguished in philosophical speculation, and it was here that the New Platonic school was established at the close of the second century after Christ by Ammonius of Alexandria (about 193 A. D.), whose disciples were Plotinus and Origen. Being for the most part Orientals, formed by

the study of Greek learning, the writings of the New Platonists are strikingly characterized -- for example, those of Ammonius Saccas, Plotinus, Iamblicus, Porphyrius — by a mixture of Asiatic and European elements. The principal Gnostic systems also had their origin in Alexandria.

Alexandrian Version, or Codex Alexandrinus, a manuscript in the British Museum, of great importance in Biblical criticism, written on parchment with uncial letters, and belonging probably to the latter half of the sixth century. It contains the whole Greek Bible (the Old Testament being according to the Septuagint), together with the letters of Bishop Clement of Rome, but it wants parts of Matthew, John, and Second Corinthians. The Patriarch of Constantinople, who in 1628 sent this manuscript as a present to Charles I, said he had received it from Egypt (whence its name).

Alex'is Michai'lovitch (son of Michael) (1629-1676), second Russian czar of the line of Romanoff (the present dynasty). He did much for the internal administration and for the enlargement of the empire; reconquered Little Russia from Poland, and carried his authority to the extreme east of Siberia. He was father of Peter the Great.

Alex'ius Comne'nus (1048-1118), Byzantine emperor. See Byzantine Empire.

Alfal'fa, a name given to a perennial forage plant, and one of the most valuable of the leguminous plants grown for the supply of green food to cattle. It is sometimes known as Lucerne. It is a native of the south of Europe, and has been cultivated there from an unknown antiquity. It is largely culti-vated in some parts of North and South America. It is especially adapted to the Southern states. It endures great droughts, its roots penetrating very deep into the ground. It is the best of all forage crops for a drought. It delights in a sight and concernent drought. It delights in a rich and calcareous soil, and never succeeds on damp soils or tenacious clays. It is a perennial, and if kept free from weeds affords good crops for six, seven, or more years. It is sown in rows, at 10 or 14 inches apart, and may be mown several times in a year, growing very quickly after being mown. The quantity of produce is very great -sometimes from twenty to thirty tons per annum—and few other forage plants are ready for use so early in spring. Alfalfa has a rather erect stem, leaves with three obovate-oblong toothed leaflets; purplish-blue or sometimes yellow flowers in many-flowered racemes, and pods twisted two or three times round.

Alfara'bi, an eminent Arabian scholar of the tenth century; died at Damascus in 950. wrote on the Aristotelian philosophy, and compiled a kind of encyclopedia.

Alfleri (al-fe-ā'rē), VITTORIO, COUNT (1749-1803), Italian poet. After extensive European travels he began to write, and his first play, Cleopatra (1775), being received with general applause, he determined to devote all his efforts to attaining a position among writers of dramatic

poetry. He died at Florence and was buried in the church of Santa Croce, between Macohiavelli and Michael Angelo, where a beautiful monument by Canova covers his remains. He wrote twenty-one tragedies and six comedles. He is considered the first tragic writer of Italy, and has served as a model for his successors. Alfieri composed also an epic, lyrics, satires, and poetical translations from the ancient classics. He left an interesting autobiography.

Alford, HENRY, D. D. (1810-1871), Dean of Canterbury, an English poet, scholar, and miscellaneous writer. He wrote an edition of the Greek Testament with commentary, which occupied him for twenty years. In 1857 he was appointed Dean of Canterbury. Among other things he wrote Chapters on the Poets of Ancient Greece, Sermons, Psalms and Hymns, Homilies on the Acts of the Apostles, Letters from Abroad, Poetical Works, Plea for the Queen's English.

Alfred the Great (849-901), king of the West Saxons. The youngest son of Ethel-wulf, who reigned 836-858, he came to the throne in 871, the intervening thirteen years having been occupied by the reigns of his three older brothers. In his youth Alfred was an eager student, and so remained through life. His entire reign of 30 years was occupied in repelling the attacks of invading Danes and Northmen, and in restoring his country from the effects of their ravages. On coming to the throne Alfred made a truce with the Danes, who turned their attention to the other provinces of Britain. It is to be noticed that Alfred was not king of all England, his dominions having extended hardly as far north as the mouth of the Severn. He fitted out a number of ships and with these resumed hostilities in 876. The following spring he is said to have met a force of 120 Danish ships and driven them on shore, where all on board perished in the wreck. The next winter the Danes invaded in large numbers, and Alfred with his followers fled to the hills and woods for safety. It is to this period that the familiar legend of the burning cakes be-longs. He was joined by a band of trusty followers, and made repeated sallies against the enemy's possessions. In May, 878, he prepared to attack the Danish army under Guthrum at Eddington. It is said that two or three days before the battle he entered the Danish camp disguised as a gleeman, and gained all the information desired respecting their strength and position. In the battle that followed, the Danes were utterly defeated. Guthrum and his followers accepted Christianity and were assigned territory north of Wessex. He afterward ceded to them the eastern portion of Mercia, which became known as the Danelagh. Alfred was now the ruler of nearly all England, though never recognized by title as such. During the period of peace which followed Alfred rebuilt the cities and fortresses and improved his fleet. Ships were stationed at intervals along the coast to guard against invasion. It is to this period that Alfred's most

Important government reforms and literary labors belong. He established a regular militia which should be able to protect the several parts of the kingdom without leaving any district defenseless. The last invasion during Alfred's reign was in 894 under the famous Hastings. After three years of hard fighting in nearly all parts of the kingdom, the invaders were driven out. Alfred's last years were passed in peace. He was succeeded by his son, Edward the Elder.

Of all the monarchs to whom the title of "Great" has been given, none deserves it, in point of character, as does Alfred. The selfish ambition and cruelty which have stained the characters of other great rulers are not recorded in his life. In the making and administration of laws, in his careful oversight of the courts of justice, in his promotion of the arts of peace, he had the welfare of his subjects ever in view. He was blessed with signal good judgment in choosing his advisers. Of his military genius, the record of obstacles patiently combated and victoriously overcome is sufficient witness. He was in belief and in practise a devout Christian; for many years he suffered uncomplainingly the ravages of a dread, mysterious disease. Alfred is conspicuous for the patronage he gave to letters, and his own learning and industrious scholarship are most remarkable. To bring knowledge within reach of his subjects he translated Bede's Ecclesiastical History of England, Gregory's Pastoral Care, Boëthius's Consolations of Philosophy, from Latin into Anglo-Saxon, adding much of his own composition. It was during his reign that the valuable Anglo-Saxon Chronicle assumed a systematic form. He represents all that is greatest and best in the modern Christian civilization of the West, and was the herald of centuries far removed from him in point of time.

Al'gæ (al'jē), an order of plants, found for the most part in the sea and fresh water, and comprising sea-weeds, etc. The higher forms have stems bearing leaf-like expansions, and they are often attached to the rocks by roots, which, however, do not derive nutriment from the rocks. A stem, however, is most frequently absent. The plants are nourished through their whole surface by the medium in which they live. They vary in size from the microscopic diatoms to forms whose stems resemble those of forest trees, and whose fronds rival the leaves of the palm. They are entirely composed of cellular tissue, and many are edible and nutritious, as carrageen or Irishmoss, dulse, etc. Kelp, iodine, and bromine are products of various species. The Algæ are also valuable as manure.

Algar'di, ALESSANDRO (1602-1654), one of the chief Italian sculptors of the seventeenth century. He lived and worked chiefly at Rome; executed the tomb of Leo XI in St. Peter's, and a marble relief with life-size figures over the altar of St. Leo there.

Algarve ( $\dot{a}$ ll- $g\dot{a}$ *i* ' $v\dot{a}$ ), a maritime province of Portugal occupying the southern portion of the kingdom; mountainous but with some



fertile tracts. Area 2,099 sq. mi.; pop. 200,-000.

Al'gebra, a kind of generalized arithmetic, in which numbers or quantities and operations, often also the results of operations, are represented by symbols. Thus the expression  $xy + cz + dy^{2}$  denotes that a number represented by z is to be multiplied by a number represented by y, a number c multiplied by a number z, a number d by a number ymultiplied by itself (or squared), and the sum taken of these three products. So the equation (as it is called)  $x^2 - 7x + 12 = 0$  expresses the fact that if a certain number x is multiplied by itself, and this result made less by seven times the number and greater by twelve, the result is 0. In this case x must either be 3 or 4 to produce the given result; but such an equation (or formula) as (a+b) $(a-b) = a^2 - b^2$  is always true whatever values may be assigned to a and b. Algebra is an invaluable instrument in intricate calculations of all kinds, and enables operations to be performed and results obtained that by arithmetic would be impossible, and its scope is still being extended.

The beginnings of algebraic method are to be found in Diophantus, a Greek of the fourth century of our era, but it was the Arabians that introduced algebra to Europe, and from them it received its name. The first Arabian treatise on algebra was published in the reign of the great Caliph Al Mamun (813–833) by Mohammed Ben Musa. In 1202 Leonardo Fibonacci of Pisa, who had traveled and studied in the East, published a work treating of algebra as then understood in the Arabian school. From this time to the discovery of printing considerable attention was given to algebra, and the work of Ben Musa and another Arabian treatise, called the Rule of Algebra, were translated into Italian. The first printed work treating on algebra (also on arithmetic, etc.) appeared at Venice in 1494, the author being a monk called Luca Pacioli da Bergo. Rapid progress now began to be made, and among the names of those to whom advances are to be attributed are Tartaglia and Cardan. About the middle of the sixteenth century the German Stifel introduced the signs  $+, -, \sqrt{}$ , and Recorde the sign =. Recorde wrote the first English work on algebra. François Vieta, a French mathematician (1540-1603), first adopted the method which has led to so great an extension of modern algebra, by being the first who used general symbols for known quantities as well as for unknown. It was he also who first made the application of algebra to geometry. Albert Girard extended the theory of equations by the supposition of imaginary quantities. The Englishman Harriot, early in the seventeenth century, discovered negative roots, and established the equality between the number of roots and the units in the degree of the equation. He also invented the signs < >, and Oughthred that of  $\times$ . Descartes, though not the first to apply algebra to geometry, has, by the extent and importance of his applications, commonly acquired the

credit of being so. The same discoveries have also been attributed to him as to Harriot, and their respective claims have caused much controversy. He obtained by means of algebra the definition and description of curves. Since his time algebra has been applied so widely in geometry and higher mathematics that we need only mention the names of Fermat, Wallis, Newton, Leibnitz, De Moivre, Mac Laurin, Taylor, Euler, D'Alembert, Lagrange, Laplace, Fourier, Poisson, Gauss, Horner, De Morgan, Sylvester, Cayley, Boole, Jevons, and others who applied the algebraic method not only to formal logic but to political economy.

Algeciras (àl-he-thē' ràs), à seaport of Spain, on the west side of the Bay of Gibraltar, a wellbuilt town carrying on a brisk coasting trade. It was the first conquest of the Arabs in Spain (711), and was held by them till 1344, when it was taken by Alphonso XI of Castile after a siege of twenty months. Near Algeciras, in July, 1801, the English admiral Saumarez defeated the combined French and Spanish fleets, after having failed in an attack a few days before. Pop. 14,230.

Alger, HORATIO, JR., an American author of books for young people, born in Massachusetts, 1834. His works are numerous and very popular.

Alger, RUSSELL A., an American soldier and statesman, b. in Medina co., O., 1836, in a log cabin. His parents died when he was twelve years old, leaving four children to fight the battles of life. When fourteen years of age he began to work as a common farm laborer at \$3 a month. He received a fair English education, but it was in the university of adversity. Shortly after his marriage the war broke out, and in August, 1861, he enlisted in the Second Michigan cavalry, and was commissioned as captain. He was several times wounded, and was obliged to resign from the army on Sept. 20, 1864. Returning from the field he settled in Detroit, and became interested in the lumber trade, so that to-day he is the largest lumber dealer in the world. In 1884 he was elected governor of the state of Michigan on the Republican ticket and in February, 1897, was selected by President McKinley as his secretary of war.

Alge'ria, a French colony in North Africa, area 122,878 sq. mi. The country is divided into three departments—Algiers, Oran, and Constantine. The country is traversed by the Atlas Mountains, two chains of which—the Great Atlas bordering on the Sahara, and the Little, or Maritime Atlas, between it and the sea—run parallel to the coast, the former attaining a height of 7,000 feet. The climate varies considerably according to elevation and local peculiarities. There are three seasons: winter from November to February, spring from March to June, and summer from July to October. The summer is very hot and dry. In many parts of the coast the temperature is moderate and the climate so healthy that Algeria is now a winter resort for invalids.

The chief products of cultivation are wheat, barley, and oats, tobacco, cotton, wine, silk,

and dates. Early vegetables, especially potatoes and peas, are exported to France and England. A fiber called *alfa*, a variety of espart, which grows wild on the high plateaux, is exported in large quantities. Cork is also exported. There are valuable forests, in which grow various sorts of pines and oaks, ash, cedar, myrtle, pistachio-nut, mastic, carob, etc. The Australian gum-tree has been successfully introduced. Agriculture often suffers much from the ravages of locusts. Among wild animals are the lion, panther, hyena, and jackal; the domestic quadrupeds include the horse, the mule, cattle, sheep, and pigs (introduced by the French). Algeria possesses valuable minerals, including iron, copper, lead, sulphur, zinc, antimony, marble (white and red), and lithographic stone.

The exports (besides those mentioned above) are olive-oil, rawhides, wood, wool, tobacco, oranges, etc.; the imports: manufactured goods, wines, spirits, coffee, etc. The manufacturing industries are unimportant, and include morocco leather, carpets, muslins, and silks. French money, weights, and measures are generally used, The chief towns are Algiers, Oran, Constantine, Bona, and Tlemcen. There are about 1,300 miles of railways opened; there is also a considerable network of telegraph lines.

The two principal native races inhabiting Algeria are Arabs and Berbers. The former are mostly nomads, dwelling in tents and wan-dering from place to place. The Berbers, here called Kabyles, are the original inhabitants of the territory and still form a considerable part of the population. They speak the Berber language, but use Arabic characters in writing. The Jews form a small but influential part of the population. Various other races also exist. Except the Jews all the native races are Mohammedans. There are over 260,000 colonists of French origin in Algeria, and over 200,000 colonists natives of other European countries (chiefly Spaniards and Italians). Algeria is governed by a governor-general, who is assisted by a council appointed by the French Government. The settled portion of the country, in the three departments of Algiers, Constantine, and Oran, is treated much as if it were a part of France, and each department sends two deputies and one senator to the French chambers. The rest of the territory is under military rule. The colony costs France a consid-erable sum every year. Population of civil ter. 3,324,475; of mil. ter. 492,990; total, 3,817,465.

The country now called Algeria was known to the Romans as Numidia. It flourished greatly under their rule. It was conquered by the Vandals in 430-431 A. D., and recovered by Belisarius for the Byzantine Empire in 533-534. About the middle of the seventh century it was overrun by the Saracens. The town of Algiers was founded about 935 by Yussef Ibn Zeiri, and the country was subsequently ruled by his successors and the dynasties of the Almoravides and Almohades. After the overthrow of the latter, about 1269, it broke up into a number of small independent terri-

The Moors and Jews who were driven tories. out of Spain by Ferdinand and Isabella at the end of the fifteenth century settled in Algeria. Various expeditions were made by Spain against Algeria, and by 1510 the greater part of the country was made tributary. A few years later the Algerians invited to their assistance the Turkish pirate Horush Barbarossa, who made himself Sultan of Algiers in 1516, but was not long in being taken by the Span-iards and beheaded. His brother and successor put Algiers under the protection of Turkey (about 1520), and organized the sys-tem of piracy which was long the terror of European commerce, and was never wholly suppressed till the French occupation. Henceforth the country belonged to the Turkish Empire, though from 1710 the connection was little more than nominal. The depredations of the Algerian pirates were a continual source of irritation to the powers, who sent a long series of expeditions against them. In 1815 a U. S. fleet defeated an Algerian one and forced the dey to agree to a peace in which he recognized the American flag as inviolable. In 1816 Lord Exmouth with an English fleet bombarded Algiers, and exacted a treaty by which all the Christian slaves were at once released, and the dey undertook for the future to treat all his prisoners of war as the European law of nations demanded. At last the French, 1830, sent a force of over 40,000 men against the country. Algiers was speedily occupied, the dey retired, and the country was without a government, but resistance was organized by Abd-el-Kader, an Arab\_chief whom the emergency had raised up. He began his warlike career of fifteen years by an attack on Oran in 1832, and after an obstinate struggle the French, in February, 1834, consented to a peace, acknowledging him as ruling over all the Arab tribes west of the Shelif by the title of Emir of Maskara. War was soon again renewed with varying fortune, and in 1837, in order to have their hands free in attacking Constantine, the French made peace with Abd-el-Kader, leaving to him the whole of western Algeria except some coast towns. Abd-el-Kader prepared for another conflict, and in 1838, broke into French territory with a strong force, and for a time the supremacy of the French was endangered. Gen. Bugeaud was appointed governer-general in February, 1841. In the autumn of 1841 Saida, the last fortress of Abd-el-Kader, fell into his hands. Abd-el-Kader found himself compelled to seek refuge in the adjoining empire. From Marocco he twice made a descent upon Algeria, on the second occasion defeating the French in two battles; and in 1844 he even succeeded in raising an army in Marocco to withstand the French. Bugeaud crossed the frontier, and inflicted a severe defeat on this army, while a French fleet bombarded the towns on the coast. The emperor of Marocco was at length compelled to agree to a treaty, in which he not only promised to refuse Abd-el-Kader his assistance, but even engaged to lend his assistance against him. Reduced to extremi-

ties Abd-el-Kader surrendered, 1847, and was taken to France a prisoner, but was released on his promise not to return to Algeria. Repeated risings have taken place, especially during the Franco-German war of 1871.

Algiers (al'jerz), a city and seaport on the Mediterranean, capital of Algeria, on the Bay of Algiers, partly on the slope of a hill facing the sea. The old town, which is the higher, is oriental in appearance, with narrow, crooked streets, and houses that are strong, prison-like edifices. The modern French town, which occupies the lower slope and spreads along the shore, is handsomely built, with broad streets, and elegant squares. There is a large shipping trade carried on. The climate of Algiers, though extremely variable, makes it a very desirable winter residence for invalids and others from colder regions. The winter months resemble a bright, sunny autumn, while the heat of summer is not so intense as that of Egypt. Pop. 74,792.

Algo'a Bay, a bay on the south coast of Cape Colony, 425 mi. from the Cape of Good Hope, the only place of shelter on this coast for vessels during the prevailing northwest gales. The usual anchorage is off Port Elizabeth, on its west coast, now a place of large and increasing trade.

**Aigo'ma**, a district of Canada, on the north side of Lake Superior, forming the northwest portion of Ontaria, rich in silver, copper, iron, etc.

Algon'kins, one of the two great families of North American Indians, formerly spread over a great extent of territory, and still forming a large proportion of the Indians of Canada. They consist of four groups; namely, I, the eastern group, comprising the Massachusetts, Narragansetts, Mohicans, Delawares, and other tribes; 2, the northeastern group, consisting of the Abenakis, etc.; 3, the western group, made up of the Shawnees, Miamis, Illinois, etc.; 4 the northwestern group, including the Chippewas, or Ojibbewas, the largest of all the tribes.

Alhama (à-là'mà) (that is, "the bath"), a town of southern Spain, province of Granada, 25 mi. s.w. of Granada, celebrated for its warm medicinal (sulphur) baths and drinking waters. It formed a Moorish fortress, the recovery of which in 1482 by the Spaniards led to the entire conquest of Granada. It was thrown into ruins by an earthquake in December, 1884. Pop. 8,000.

**Alham'bra** ("the red castle"), a famous group of buildings in Spain, forming the citadel of Granada when that city was one of the principal seats of the empire of the Moors in Spain, situated on a height, surrounded by a wall flanked by many towers, and having a circuit of 24 mi. Within the circuit of the walls are two churches, a number of mean houses and some straggling gardens, besides the palace of Charles V and the celebrated Moorish palace, which is often distinctively spoken of as the Alhambra. This building was the royal palace of the kings of Granada. The greater part of

the present building belongs to the first half of the fourteenth century. It consists mainly of buildings surrounding two oblong courts, the one called the Court of the Fish-pond (or of the Myrtles), 138 by 74 feet, lying north and south; the other called the Court of the Lions, from a fountain ornamented with twelve lions in marble, 115 feet by 66 feet, lying east and west, described as being, with the apartments that surround it, "the gem of Arabian art in• Spain, its most beautiful and most perfect example." Its design is elaborate, exhibiting a profusion of exquisite detail, gorgeous in coloring, but the smallness of its size deprives it of the element of majesty. The peristyle or portico on each side is supported by 128 pillars of white marble, 11 feet high, sometimes placed singly and sometimes in groups. Two pavilions project into the court at each end, the domed roof of one having been lately restored. Some of the finest chambers of the Alhambra open into this court, and near the entrance a museum of Moorish remains has been formed. The prevalence of stucco or plaster ornamentation is one of the features of theAlhambra, which becomes especially remarkable in the beautiful honey-comb-stalactical pendentives which the ceilings exhibit. Arabesques and geometrical designs with interwoven inscriptions are present in the richest profusion. The beauties of Alhambra have been glowingly described by Washington Irving.

All (a' lē) (A. D. 602-661), cousin and son-inlaw of Mohammed, the first of his converts, and the bravest and most faithful of his adherents.

Ali, Pasha of Yanina (1741-1822), generally called *Ali Pasha*, a bold and able, but ferocious and unscrupulous Albanian. He made himself master of a large part of Albania, including Yanina, which the Porte sanctioned his holding, with the title of pasha. In 1820 Sultan Mahmoud pronounced his deposition. He surrendered in 1822, and his treasures were seized by the Porte.

Alicante (à-lê-kản'tả), a fortified town and Mediterranean seaport in Spain, capital of the province of the same name, 80 mi. s. by w. of Valencia. The principal manufactures are cotton, linen, and cigars; one cigar manufactory employing above 3,000 women. The chief export is wine, which largely goes to England. In 718 it was taken by the Moors, from whom it was wrested about 1240. It was besieged and bombarded by the French in 1709 and in 1812, and by the people of Cartagena during the commotions of 1873. Pop. 35,470.—The province is very fruitful and well cultivated, producing wine. silk, fruits, etc. Area 2,098 sq.mi. Pop. 427,818.

Alicata (or Licata) (à-lè-kä'tà. lè-kä, 'tà), the most important commercial town on the s. coast of Sicily, 24 mi. e s.e. of Girgenti, with a considerable trade in sulphur, grain, wine, oil, nuts, almonds, and soda. It occupies the site of the town which the Tyrant Phintias of Acragas erected and named after himself, when Gela was destroyed in 280. Pop. 15,906.

A'lien, in relation to any country, a person born out of the jurisdiction of the country, and not having acquired the full rights of a citizen of it. The position of aliens depends upon the laws of the respective countries, but generally speaking, aliens owe a local allegiance, and are bound equally with natives to obey all general rules for the preservation of order which do not relate especially to citizens. In the U.S. the position of aliens as regards acquisition and holding of real property differs somewhat in the different states, though in recent times the disabilities of aliens have been removed in most of them. Personal property they can take, hold, and dispose of, like native citizens. Individual states have no jurisdiction on the subject of naturalization, though they may pass laws admitting aliens to any privilege short of citizenship. A naturalized citizen is not eligible to election as president or vice-president of the U.S., and cannot serve as senator until after nine years' citizenship, nor as a member of the House of Representatives until after seven years' citizenship. Five years' residence in the U.S. and one year's permanent residence in the particular state where the application is made are necessary for the attainment of citizenship. See Naturalization.

Alien and Sedition Laws.—French interference in the domestic politics of the U. 8. caused the passage by Congress, June 25, 1798, of the Alien law, giving the president power to order aliens whom he should adjudge dangerous, out of the country, and providing for the fine and imprisonment of those who refused to go. The Sedition law, passed July 14, 1798, to remain in force till March 3, 1801, imposed fine and imprisonment on conspirators to resist government measures, and on libelers and scandalizers of the government, Congress, or the president.

Aligarh (a-le-gar'), a fort and town in India, in the Northwest Provinces, on the East Indian railway, 84 mi. s.e. of Delhi. The town properly called Koel or Coel, is distant about 2 mi. from the fort. Pop. 61,730. The district has an area of 1,054 sq. mi., and a population of 1,021,187.

Al'iment, food, a term which includes everything, solid or liquid, serving as nutriment for the bodily system. Aliments are of the most diverse character, but all of them must contain nutritious matter of some kind, which, being extracted by the act of digestion, enters the blood, and effects by assimilation the repair of the body. Alimentary matter, therefore, must be similar to animal substance, or transmutable into such. All alimentary substances must, therefore, be composed in a greater or less degree of soluble parts, which easily lose their peculiar qualities in the process of digestion, and correspond to the elements of the body. The food of animals consists for the most part of substances containing little oxygen and exhibiting a high degree of chemical combination, in which respects they differ from most sub-

stances that serve as sustenance for plants. which are generally highly oxidized and exhibit little chemical combinations. According to the nature of their constituents most of the aliments of animals are divided into nitrogenous (consisting of carbon, hydrogen, and oxygen along with nitrogen, and also of sulphur and phosphorus) and non-nitrogenous (consisting of carbon, hydrogen, and oxygen without nitrogen). Water and salts are usually considered as forming a third group, and in the widest sense of the word aliment, oxygen alone, which enters the blood in the lungs, forms a fourth. The articles used as food by man do not consist entirely of nutritious substances, but with few exceptions are compounds of various nutritious with in-digestible and accordingly innutritious sub-stances. The only nitrogenous aliments are albuminous substances, and these are contained largely in animal food (flesh, eggs, milk, cheese). The principal non-nitrogenous substance obtained as food from animals is fat. Sugar is so obtained in smaller quantities (in milk). While some vegetable substances also contain much albumen, very many of them are rich in starch. Among vegetable substances the richest in albumen are the legumes (peas, beans, and lentils), and following them come the cereals (wheat, oats, etc.). Sugar, water, and salts may pass without any change into the circulatory system; but albuminous substances cannot do so without being first rendered soluble and capable of absorption (in the stomach and intestines); starch must be converted into sugar, and fat emulsified (chiefly by the action of the pancreatic juice). One of the objects of cooking is to make our food more susceptible of the operation of the digestive fluids.

The relative importance of the various nutritious substances that are taken into the system and enter the blood depends upon their chemical constitution. The **#buminous sub**stances are the most indispensable, inasmuch as they form the material by which the constant waste of the body is repaired, whence they are called by Liebig the substance-formers. But a part of the operation of albuminous nutriments may be performed equally well, and at less cost, by non-nitrogenous substances, that part being the maintenance of the temperature of the body. As is well known, the temperature of warm-blooded animals is considerably higher than the ordinary temperature of the surrounding air, in man about 98° F., and the uniformity of this temperature is maintained by the heat which is set free by the chemical processes (of oxidation) which go on within the body. Now these processes take place as well with nonnitrogenous as with nitrogenous substances. The former are even preferable to the latter for the keeping up of these processes; by oxidation they yield larger quantities of heat with less labor to the body, and they are hence called the heat-givers. The best heat-giver is

fat. Albuminous matters are not only the tissue-formers of the body; they also supply the vehicle for the oxygen, inasmuch as it is of such matters that the blood corpuscles are formed. The more red-blood corpuscles an animal possesses, the more oxygen can it take into its system, and the more easily and rapidly can it carry on the process of oxidation and develop heat. Now only a part of the heat so developed passes away into the environment of the animal; another part is transformed within the body (in the muscles) into mechanical work. Hence it follows that the non-nitrogenous articles of food produce not merely heat but also work, but only with the assistance of albuminous matters, which, on the one hand, compose the working machine, and, on the other hand, convey the oxygen necessary for oxidation.

The wholesome or unwholesome character of any aliment depends, in a great measure, on the state of the digestive organs in any given case, as also on the method in which it is cooked. Very often a simple aliment is made indigestible by artificial cookery. In any given case, the digestive power of the individual is to be considered in order to determine whether a particular aliment is whole-some or not. In general, therefore, we can only say that that aliment is healthy which is easily soluble, and is suited to the power of digestion of the individual. Man is fitted to derive nourishment both from animal and vegetable aliment, but can live exclusively on either. The nations of the North incline generally more to animal aliments; those of the South, and the Orientals, more to vegetable. The inhabitants of the most northern regions live almost entirely upon animal food, and very largely on fat on account of its heatgiving property. See Dietetics, Digestion, Adulteration, etc.

Alimentary Canal, a common name given to the cosophagus, stomach, and intestines of animals. See *Mnatomy*.

Al'imony, in law, the allowance to which a woman is entitled while a matrimonial suit is pending between her and her husband, or after a legal separation from her husband, not occasioned by adultery or elopement on her part.

Al' ison, ARCHTBALD (1792-1867), an English lawyer and writer of history. His chief work, *The History of Europe from 1789 to 1815*, was first issued in ten vols. in 1833-42, the narrative being subsequently brought down to 1852, the beginning of the second French Empire. This work displays industry and research, and is generally accurate, but not very readable. Its popularity, however, has been immense, and it has been translated into French, German, Arabic, Hindustani, etc.

Aliwal', a village of Hindustan in the Punjab, on the left bank of the Sutlej, celebrated from the battle fought in its vicinity, Jan. 28, 1846, between the Sikhs and a British army, resulting in the total defeat of the Sikhs.

Aliz'arine, a substance contained in the madder root, and largely used in dyeing reds

of various shades. Formerly madder root was largely employed as a dye-stuff, its capability of dyeing being chiefly due to the presence in it of alizarine; but the use of the root has been almost superseded by the employment of alizarine itself, prepared artificially from one of the constituents of coal-tar. It forms yellowish-red prismatic crystals, nearly insoluble in cold, but dissolved to a small extent by boiling water, and readily soluble in alcohol and ether. It possesses exceedingly strong tinctorial powers.

Al'kall, a term first used to designate the soluble part of the ashes of plants, especially sea-weed. Now the term is applied to various classes of bodies having the following properties in common: (1) solubility in water; (2) the power of neutralizing acids, and forming salts with them; (3) the property of corroding animal and vegetable substances; (4) the property of altering the tint of many coloring matters — thus, they turn litmus, reddened by an acid, into blue; turmeric, brown; and syrup of violets, an infusion of red cabbages, green. The alkalies are hydrates, or water in which half the hydrogen is replaced by a metal or compound radical. In its restricted and common sense the term is applied to four substances only: hydrate of potassium (potash), hydrate of sodium (soda), hydrate of lithium (lithia), and hydrate of ammonium (an aqueous solution of ammonia). In a more general sense it is applied to the hydrates of the so-called alkaling earths (baryta, strontia, and lime), and to a large number of organic substances, both natural and artificial, de-scribed under Alkaloid. Volatile alkali is a name for ammonia.

Al'kaloid, a term applied to a class of nitrogenized compounds having certain alkaline properties, found in living plants, and containing their active principles, usually in combination with organic acids. Their names generally end in ine, as morphine, quinine, aconitine, caffeine, etc. Most alkaloids occur in plants, but some are formed by decomposition. Their alkaline character depends on the nitrogen they contain. Most natural alkaloids contain carbon, hydrogen, nitrogen, and oxygen, but the greater number of artificial ones want the oxygen. The only property common to all alkaloids is that of combining with acids to form salts, and some exhibit an alkaline reaction with colors. Alkaloids form what is termed the organic bases of plants. Although formed originally within the plant, it has been found possible to prepare several of these alkaloids by purely artificial means.

Al'kanet, a dycing drug, the bark of the root of the Anchusa, or Alkanna tinctoria, a plant with downy and spear-shaped leaves, and clusters of small purple or reddish flowers. The plant is sometimes cultivated in Britain, but most of the alkanet of commerce is imported from the Levant or from southern France. It imparts a fine deep-red color and is used for coloring oils, plasters, lip-salve, confections, etc.; also in compositions for rubbing and giving color to mahogany furniture, and to color spurious port-wine.

Alkar'sin, an extremely poisonous liquid containing kakodyle, together with oxidation products of this substance, and formerly known as *Cadet's fuming liquor*, characterized by its insupportable smell and high degree of spontaneous combustibility when exposed to air.

Alkmaar (älk'mär), a town of the Netherlands, prov. of North Holland, 20 mi. n. n. w. of Amsterdam. It has manufactures of salt, sail-cloth, vinegar, leather, etc., and an extensive trade in cattle, corn, butter, and cheese. Pop. 13,304.

Al'lah, in Arabic, the name of God, a word of kindred origin with the Hebrew word *Elohim.* Allah Akbar (God is great) is a Mohammedan war-cry.

Allahabad ("City of Allah"), an ancient city of India, capital of the Northwest Provinces. Allahabad is one of the chief resorts of Hindu pilgrims, who have their sins washed away by bathing in the waters of the sacred rivers Ganges and Jumna at their junction; and is also the scene of a great fair in December and January. A large general and transit trade is carried on. The town is as old as the third century B. c. In the mutiny of 1857 it was the scene of a serious outbreak and massacre. Pop. 150,378.—The division of ALLAHABAD contains the districts of Cawnpur, Futlehpur, Hamirpur, Banda, Jaunpur, and Allahabad. Area 13,746 sq. mi.; pop. 5,754,855.—The DISTRICT contains an area of 2,833 sq. mi., about five sixths being under cultivation. Pop. 1,474,106.

Allan, DAVID (1744-1796), a Scottish painter. His illustrations of the *Gentle Shepherd*, the *Cotter's Saturday Night*, and other sketches of rustic life and manners in Scotland, obtained for him the name of the "Scottish Hogarth."

Alian, GEORGE WILLIAM, born 1822, in Toronto, Canada; graduated at Upper Canada College in 1839, and was admitted to the bar in 1846. In 1855 he was elected mayor of Toronto, and in 1858 sat in the Legislative Council for York division. In 1867 he was elected to the Senate, and in 1876 became chancellor of Trinity College.

Allan, Sin HUGH (1810-1882), born in Scotland. In 1824 he came to Canada, and established the Allan line of ocean steamers. He was a director of several banks, and was knighted in 1871.

Allan, SIR WILLIAM (1782-1850), a distinguished Scottish artist. In 1814 he exhibited his pictures, one of which, Circassian Captives, made his reputation. He now turned his attention to historical painting, and produced Knox Admonishing Mary Queen of Scots, Murder of Rizzio, Exiles on Their Way to Siberia, The Slave Market at Constantinople, etc.; latterly also battle scenes, as the Battle of Prestonpans, Nelson Boarding the Sun Nicolas, and two pictures of the Battle of Waterloo, the one from the British, the other from the French position, and delineating the actual scene and the incidents therein taking place at the moment chosen for the representation.

Alleghany (al-le-gā'ni), a river of Pennsylvania and New York, which unites with the Monongahela at Pittsburg to form the Ohio; navigable nearly 200 miles above Pittsburg.

Alleghany *l*iountains, a name sometimes used as synonymous with Appalachians, but also often restricted to the portion of those mountains that traverses the states of Virginia, Maryland, and Pennsylvania from southwest to northeast, and consists of a series of parallel ridges for the most part wooded to the summit, and with some fertile valleys between. Their mean elevation is about 2,500 feet; but in Virginia they rise to over 4,000.

Ailegheny (al-le-gen'i), a city of Pennsylvania, on the River Alleghany, opposite Pittsburg, of which it may be considered virtually to be a suburb, and with which it is connected by six bridges. The principal industries are connected with iron and machinery. Also called *Allegheny City.* Pop. 110.605.

ery. Also called Allegheng City. Pop. 110,605. Allen, ETHAN (1737-1789), soldier, born in Litchfield, Conn. About 1763 he settled near Bennington. In 1764, the king decided in favor of the claim of New York to jurisdiction over the Green Mountain territory against the settlers under the New Hampshire grants. Allen was chosen to plead the cause of the New Hampshire settlers at Albany, N. Y. The courts decided adversely. Allen was made colonel of the "Green Mountain Boys," who, with the New Hampshire grantees, expelled the New York settlers. Governor Tryon, of New York, offered \$750 reward for Allen. Allen retaliated by offering a reward for Tryon. In 1775, after the battle of Lexington, the condition of Fort Ticonderoga attracted the attention of the patriots. Allen and Benedict Arnold both were eager to effect its capture. Arnold was commissioned colonel by Massachusetts, but the "Green Mountain Boys," with Allen, reached Lake George before Arnold overtook them, and they would not receive a new commander. On May 10, when only eighty-four of his men had as yet crossed the lake, Allen rushed into the fort and ordered the commander to surrender "in the name of the Great Jehovah and the Continental Congress !" The fort contained a large amount of artillery and arms. Allen went to Philadelphia, where he received the thanks of Congress for his services. He was sent on a secret mission to Canada to learn the views of the Canadians as to rebellion. On his way to Gen. Montgomery's expedition he took part in a rash adventure at Montreal on September 25, and was captured and sent to England. He was returned to this country, where he was confined in prison-ships, but later allowed partial liberty. In 1779 Allen published a Narratics of his treatment while a British prisoner. It is a compound of local barbarisms, Scripture, physiology, and Oriental wildness. After Burgoyne's surrender at Saratoga, Congress secured Allen's release. Allen, on obtaining his freedom, was ap-

pointed major-general of the Vermont militia, and sent as an agent to Congress to secure the admission of Vermont to the Confederation. Congress hesitated, and the British commanders endeavored to persuade Allen to restore the authority of the crown. Vermont sent these letters to the president of Congress, and soon became a part of the Union, although not recognized as a state until 1791. After the Revolution Allen lived in retirement, writing a book on natural religion, 1784, entitled *Reason the Only Oracle of Man.* This is the first work opposed to Christianity published in America.

Allen, WILLIAM, D. D. (1784–1868), American clergyman and author. He was president of Bowdoin College 1820-1839; author of Ameriean Biographical and Historical Dictionary; a Supplement to Webster's Dictionary; Poems, etc.

**Allentown**, Lehigh co., Pa., on Lehigh River, 18 mi. above its junction with the Delaware. It has an important trade in coal and iron ore, with large blast-furnaces, rollingmills, etc. Pop. 25,228.

Al'lia, a small affluent of the Tiber, joining it about 12 miles from Rome, famous for the defeat sustained by the Roman army from Brennus and his Gauls, resulting in the capture and sack of Rome, about 390 B. C.

Alliance, Stark co., 0., 57 mi. s. e. of Cleveland, and 93 miles n. n. w. of Pittsburg; seat of Mt. Union College. Manufactures of bagging, white lead, and rolling mill. Pop. 7,856.

Al'libone, SAMUEL AUSTIN, LL. D. (1816-1889), an American author. He compiled a most useful Critical Dictionary of English Literature and British and American Authors.

Allier (àl-lē-ā), a central department of France. It has extensive beds of coal as well as other minerals, which are actively worked, there being several flourishing centers of mining and manufacturing enterprise; mineral waters at Vichy, Bourbon, L'Archambault, etc. Large numbers of sheep and cattle are bred. Area 2,822 sq. mi. Capital, Moulins. Pop. 424,532.

Alliga'tion, a rule of arithmetic, chiefly found in the older books, relating to the solution of questions concerning the compounding or mixing together of different ingredients, or ingredients of different qualities or values. Thus, if a quantity of sugar worth 4 cents a lb. and another quantity worth 7 cents are mixed, the question to be solved by alligation is, what is the value of the mixture by the pound?

Alligator, a genus of reptiles of the crocodile family, differing from the true crocodiles in having a shorter and flatter head, in having cavities or pits in the upper jaw, into which the long canine teeth of the under jaw flt, and in having the feet much less webbed. Their habits are less aquatic. They are confined to the warmer parts of America, where they frequent swamps and marshes, and may be seen basking on the dry ground during the day in the heat of the sun. They are most active during the night when they make a loud bellowing. The largest of these animals grow

to the length of 18 or 20 feet. They are covered by a dense armor of horny scales, impenetrable by a rifle-ball, and have a huge mouth, armed with strong conical teeth. They swim with wonderful celerity, impelled by their long, laterally-compressed, and powerful tails. On land their motions are proportionally slow and embarrassed because of the length and unwieldiness of their bodies and the short-ness of their limbs. They live on fish, and any small animals or carrion, and sometimes catch pigs on the shore, or dogs which are swim-ming. They even sometimes make man their ming. prey. In winter they burrow in the mud of swamps and marshes, lying torpid till the warm weather. The female lays a great number of eggs, which are deposited in the sand or mud, and left to be hatched by the heat of the sun, but the mother alligator is very attentive to her young. The most flerce and dangerous species is that found in the southern part of the U.S., having the snout a little turned up. slightly resembling that of the pike. The alligators of S. A. are there very often called Caymans. One species is known also as Spectacled Cayman, from the prominent bony rim surrounding the orbit of each eye. The flesh of the alligator is sometimes eaten.

Alligator-pear, an evergreen tree of the natural order Lauraceæ, with a fruit resembling a large pear, 1 to 2 lbs. in weight, with a firm marrow-like pulp of a delicate flavor; called also avocado-pear, or subaltern's butter. It is a native of tropical America and the West Indies.

Allison, WILLIAM B., b. in Wayne co. O., 1829, practised law in Ohio until 1857, when he removed to Dubuque, Ia. He served in Congress as a Republican 1863-1871. In 1873 he was elected to the U. S. Senate, and re-elected in 1878, 1884, and 1890.

Allitera'tion, the repetition of the same letter at the beginning of two or more words immediately succeeding each other, or at short intervals; as many men, many minds; death defles the doctor; "Apt alliteration's artful aid." "Puffs, powders. patches, bibles, billet-doux." In the ancient German and Scandinavian and in early English poetry alliteration took the place of terminal rhymes, the alliterative syllables being made to recur with a certain regularity in the same position in successive verses. So far has alliteration sometimes been carried that long compositions have been written every word of which commenced with the same letter.

Allo' dium, land held in one's own right, without any feudal obligation to a superior or lord. See *Feudal System*.

Allop' athy, the name applied by homeopathists to systems of medicine other than their own; Halınemann's principle being that "like cures like," he called his own system homeopathy, and other systems allopathy. See Homeopathy.

Al'ioway, a parish of Scotland, now included in Ayr parish. Here Robert Burns was born in 1759, and the "auld haunted kirk." near his birthplace, was the scene of the dance of witches in Tam O'Shanter.

Alloy,' a substance produced by melting together two or more metals, sometimes a definite chemical compound, but more generally merely a mechanical mixture. Most metals mix together in all proportions, but others unite only in definite proportions, and form true chemical compounds. Others again resist combination, and when fused together form not a homogeneous mixture but a conglomerate of distinct masses. The changes produced in their physicial properties by the combination of metals are very various. Their hardness is in general increased, their malleability and ductility impaired. The color of an alloy may be scarcely different from that of one of its components, or it may show traces of neither of the two. Its specific gravity is sometimes less than the mean of that of its component metals. Alloys are always more fusible than the metal most difficult to melt that enters into their composition, and generally even more so than the most easily melted one. Newton's fusible metal, composed of three parts of tin, two or five parts of lead, and five or eight parts of bismuth, melts at temperatures varying from 198° to 210° F. (and therefore in boiling water); its components fuse respectively at the tem-peratures 442°, 600°, and 478° F. Sometimes each metal retains its own fusing point. With a few exceptions metals are not used in a pure state. Printers' types are made from an alloy of lead and antimony; brass and a numerous list of other alloys are formed from copper and zinc; bronze from copper and tin. All Saints' Day, a festival of the Christian

All Saints' Day, a festival of the Christian Church, instituted in 835, and celebrated on November 1 in honor of the saints in general.

All Souls' Day, a festival of the Catholio Church, instituted in 998, and observed on November 2 for the relief of souls in purgatory.

Allspice (al'spis) (or Pimenta), is the dried berry of a West Indian species of myrtle, a beautiful tree with white and fragrant aromatic flowers and leaves of a deepshining green. Pimenta is thought to resemble in flavor a mixture of cinnamon, nutmegs, and cloves. whence the popular name of allspice; it is also called 🖉 Jamaica pepper. It is employed in cookery, also in medicine as an



agreeable aromatic, and forms the basis of a distilled water, a spirit, and an essential oil.

Aliston, WASHINGTON (1799-1843), an American painter, b. in South Carolina. He won much fame in England, and returning to America died. His Belshazzer's Feast is one of the masterpieces possessed by the Boston Athenæum. In style he imitated the Venetian School and has been called the "American Titian."

Allu'vium, deposits of soil, collected by the action of water, such as are found in valleys and plains, consisting of loam, clay, gravel, etc., washed down from the higher grounds. Great alterations are often produced by alluvium—deltas and whole islands being often formed by this cause. Much of the rich land along the banks of rivers is alluvial in its origin.

Alma, a small river of Russia, in the Crimea, celebrated from the victory gained by the allied British and French over the Russians, 1854.

Al'maden, Cal., about 60 mi. s.e. of San Francisco, with rich quicksilver mines, the product of which has been largely employed in gold and silver mining. It was so named after Almaden, in Spain, where much quick silver was mined.

Alma'gro, DIEGO DE (1475-1538), Spanish "Conquistador," a foundling. He took part with Pizarro in the conquest of Peru, and after frequent disputes with Pizarro about their respective shares in their conquests led an expedition against Chile, which he failed to conquer. On his return a struggle took place between him and Pizarro, in which Almagro was finally overcome, taken prisoner, strangled, and afterward beheaded. He was avenged by his son, who raised an insurrection in which Pizarro was assassinated in 1541. The younger Almagro was put to death in 1542 by De Castro, the new viceroy of Peru.

Al'manac, a calendar, in which are set down the rising and setting of the sun, the phases of the moon, the most remarkable positions and phenomena of the heavenly bodies, for every month and day of the year; also the several fasts and feasts to be observed in the church and state, etc., and often much mis-cellaneous information likely to be useful to the public. The term is of Arabic origin, but the Arabs were not the first to use almanacs. In England they are known from the four-teenth century, there being several English almanacs of that century existing in MS. They became generally used in Europe within a short time after the invention of printing. Their effects in France were found so mischievous, from the pretended prophecies which they published, that Henry III in 1579 forbade any predictions to be inserted in them relating to civil affairs, whether those of the state or of private persons. During the civil war of Charles I, and thence onward, English almanacs were conspicuous for the boldness of their astrological predictions, and their de-termined perpetuation of popular errors. The most famous English almanac was Poor Robin's Almanack, which was published from 1663 to 1775. In 1828 the Society for the Diffusion of Useful Knowledge, by publishing the British Almanac, took the lead in the production of an unexceptional almanac in Great Britain. The circulation of almanacs was cramped by the

### Alma-Tadema

very heavy duty of one shilling and three pence per copy till 1834, when this duty was abolished. About 200 new almanacs were started immediately on the repeal. Almanacs from their periodical character, are now more and more used as vehicles for conveying statistical and other useful information for the inhabitants of a particular country or district, or for a particular class or party. Some of the almanacs that are regularly published every year are almost indispensable to men engaged in official, mercantile, literary, or professional Official Directory of the United Kingdom, the British Almanac, Oliver and Boyd's Edinburgh Almanac, and Whitaker's Almanac. The first popular almanac in America is believed to have emanated from Bradford's press at Philadelphia, in 1687. Benjamin Franklin's Poor Richard's Almanac, first issued in 1732, had a popularity for a quarter of a century. Many leading newspapers, not a few religious denominations, and several trades and professions now issue excellent popular almanacs at inexpensive rates. The Almanach de Gotha, which has appeared at Gotha since 1764, contains information regarding the reigning families and governments, the finances, commerce, population, etc., of the different states through-out the world. It is published both in French and in German.

The Nautical Almanac, or the American Astronomical Ephemeris, is published by the U.S. Bureau of Navigation annually. It embraces all the elements necessary for determining at any time the absolute and relative places of the sun, moon, and seven principal planets and of many of the fixed stars, also several different series of phenomena for the determination of longitudes and latitudes, the distances of the moon from fixed stars and planets, eclipses, etc. To these are added rules and tables for practical use in nautical astronomy, land observations, and tables of tides. It is a text-book for the navigator and no sailor leaves the American shore without it. It informs him of his place on the ocean where there are no other guides than the sun and stars. The computations are made three years in advance and could be made still farther if necessary, but no cruise is made which lasts longer than that time and it is unneces-sary to keep farther in advance. Before the American Nautical Almanac was published we used an American edition of the British Nautical Almanac which is published annually by the British government two or three years in advance. This almanac was com-menced in 1767 by Dr. Maskelyne, astrono-mer royal. The French Connaissance des Tempes is published with the same views as the American and English almanacs. It was first issued in 1679. The German Government also publishes a nautical almanac.

Alma-Tad'ema, LAWRENCE, Dutch painter, born in 1836, resident since 1870 in England, where he is a naturalized subject. In 1876 he was elected an associate of the Royal Academy, in 1879, an academician; he is also

# Almond

a member of various foreign academies. He is especially celebrated for his pictures of ancient Roman, Greek, and Egyptian life, which are painted with great realism and archeological correctness.

Almeida (al-mā'i-da), one of the strongest fortresses in Portugal, in the province of Beira, near the Spanish border, on the Coa. Pop. 2,000. Taken by Massena from the English in 1810; retaken by Wellington in 1811.

Almeida (dål-mā'i-då), FRANCISCO DE (1450-1510), first Portuguese viceroy of India. He fought against the Moors, and being appointed governor of the new Portuguese settlements on the African and Indian coasts, he sailed for India in 1505. In Africa he took possession of Quiloa and Mombas, and in the East he conquered Cananor, Cochin, Calicut, etc., and established forts and factories. His son Lorenzo discovered the Maldives and Madagascar, but perished in an attack made on him by a fleet sent by the sultan of Egypt, with the aid of the Porte and the Republic of Venice. Hav-ing signally defeated the Mussulmans (1508), he sailed for Portugal, but was killed in a skirmish.

Almeria (àl-mà-rē'à), a fortified seaport of southern Spain, capital of province Almeria, with an important trade, exporting lead, esparto, barilla, etc. The province, which has an area of 3,300 sq. mi., is generally mountainous, and rich in minerals. Pop. of town

40,323; of province, 349,854. Almohades (ăl'mo-hădz), an Arabic or Moorish dynasty that ruled in Africa and Spain in the twelfth and thirteenth centuries. They overthrew the Almoravides in Spain, but themselves received a defeat in 1212 from which they did not recover, and in 1269 were overthrown in Africa.

Almond (a'mund), the fruit of the almond tree, a tree which grows usually to the height of 20 feet, and is akin to the peach, nectarine, It has beautiful pinkish flowers that etc. appear before the leaves, which are oval.



a.-flower. b.-fruit.

pointed, and delicately serrated. It is a native of Africa and Asia, naturalized in southern Europe, and cultivated in England for its beauty. The fruit is a drupe, ovoid, and with downy, outer surface; the fleshy covering is

#### Almoravides

tough and fibrous; it covers the compressed, wrinkled stone enclosing the seed or almond within it. There are two varieties, one sweet and the other bitter. The chief kinds of sweet almonds are the Valencian, Jordan, and Malaga. Bitter almonds come from Magador, and besides a fixed oil they contain a substance called emulsin, and also a bitter crystalline substance called amygdalin, which, acting on the emulsin, produces prussic acid, whence the aroma of bitter almonds when mixed with water. Almond-oil, a bland fixed oil, is expressed from the kernels of either sweet or bitter almonds, and is used by perfumers and in medicine. A poisonous essential oil is obtained from bitter almonds, which is used for flavoring by cooks and confectioners, also by perfumers and in medicine.

Almo'ravides (-vīdz), a Moorish dynasty which arose in northwestern Africa in the eleventh century, and having crossed the Straits of Gibraltar, gained possession of all Arabic Spain, but was overthrown by the Almohades in the following century.

Aloe (al' $\bar{o}$ ), the name of a number of plants belonging to the genus Aloe, some of which

are not more than a few inches, while others are 30 feet and upward in height; natives of Africa and other hot regions; leaves fleshy, thick, and more or less spinous at the edges or extremity; flowers with a tubular corolla. Some of the larger kinds are of great use, the fibrous parts of the leaves being made into cordage, fishing nets and lines, cloth, etc. The juice of several species



is used in medicine, under the name of abes, forming a bitter purgative. The principal drug-producing species are, the Socotrine aloe, the Barbadoes aloe, the Cape aloe, etc. A beautiful violet color is afforded by the leaves of the Socotrine aloe. The American aloe (see Agare) is a different plant altogether; as are also the aloes or lign-aloes of Scripture. Aloe fiber is obtained from species of Aloe, Agare, Yucca, etc., and is made into coarse fabrics, ropes, etc.

Aloes-wood, Eagle-wood, the inner portion of the trunk of forest trees, found in tropical Asia, and yielding a fragrant resinous substance, which, as well as the wood, is burned for its perfume. Another tree also produces aloes-wood. This wood is supposed to be the lign-aloes of the Bible.

A'lost (or Aalst) (ä'lost, älst), a town of Bel-

### Alphabet

gium, 15 mi. w. n. w. of Brussels. It has manufactures of lace, thread, linen, and cotton goods, etc., and a considerable trade. Pop. 21,631.

Alpac'a, a ruminant mammal of the camel tribe, a native of the Andes, especially of the



# Alpaca.

mountains of Chile and Peru, and so closely allied to the llama that by some it is regarded rather as a smaller variety than a distinct species. It has been domesticated, and remains also in a wild state. In form and size it approaches the sheep, but has a longer neck. It is valued chiefly for its long, soft, and silky wool, which is straighter than that of the sheep, and very strong, and is woven into fabrics of great beauty, used for shawls, clothing for warm climate, coat-linings, and umbrellas, and known by the same name. Its flesh is pleasant and wholesome.

Alpena, Alpena co., Mich., 130 mi. n. e. of Saginaw City. It is an important lumber center, has also two foundries and two banks. Pop. 12,276.

Alpes (àlp), the name of three departments in the s. e. of France, all more or less covered by the Alps or their offshoots. These are Basses ALPES: area 2,685 sq. mi.; capital, Digne; pop. 129,494. — HAUTES-ALPES ( $\overline{o}t$ - $\overline{a}lp$ ) (Upper Alps), area 2,158; capital, Gap; pop. 122,924. — ALPES-MARITIMES ( $\overline{a}lp$ - $\overline{m}a$ -ri-t $\overline{e}m$ ) (Maritime Alps). It produces in the south, cereals, vines, olives, oranges, citrons, and other fruits; and there are manufactories of perfumes, liquors, soap, etc., and valuable fisheries. It is a favorite resort for invalids. Area 1,482 sq. mi.; capital, Nice; pop. 238.-057.

Al'pha and O'mega, the first and last letters of the Greek alphabet, sometimes used to signify the beginning and the end, or the first and the last of anything; also as a symbol of the Divine Being. They were also formerly the symbol of Christianity, and engraved accordingly on the tombs of the ancient Christians.

Al'phabet (from Alpha and Beta, the first two letters of the Greek alphabet), the series of characters used in writing a language, and intended to represent the sounds of which it consists. The English alphabet, like most of those of modern Europe, is derived directly from the Latin, the Latin from the ancient

Greek, and that from the Phœnician, which again is believed to have had its origin in the Egyptian hieroglyphics, the Hebrew alphabet also having the same origin. The names of the letters in Phœnician and Hebrew must have been almost the same, for the Greek names, which, with the letters, were borrowed from the former, differ little from the Hebrew. By means of the names we may trace the process by which the Egyptian characters were transformed into letters by the Phœnicians. Some Egyptian character would, by its form, recall the idea of a house, for example, in Phœnician or Hebrew, beth. This character would subsequently come to be used wherever the sound b occurred. Its form might be afterward simplified, or even completely modified, but the name would still remain, as beth still continues the Hebrew name for b, and beta the Greek. Our letter m, which in Hebrew was called mim, water, has still a considerable resemblance to the zigzag, wavy line which had been chosen to represent water, as in the zodaical symbol for Aquarius. The letter o, of which the Hebrew name means eye, no doubt originally intended to represent that organ. While the ancient Greek alphabet gave rise to the ordinary Greek alphabet and the Latin, the Greek alphabet of later times furnished elements for the Coptic, the Gothic, and the old Slavic alphabets. The Latin characters are now employed by a great many nations, such as the Italian, the French, the Spanish, the Portuguese, the English, the Dutch, the German, the Hungarian, the Polish, etc., each nation having introduced such modifications or additions as are necessary to express the sound of the language peculiar to it. The sound of the language peculiar to it. The Greek alphabet originally possessed only six-teen letters, though the Phœnician had twentytwo. The original Latin alphabet, as it is found in the oldest inscriptions, consisted of The German alphabet twenty-one letters. consists of the same letters as the English, but the sounds of some of them are different. Anciently certain characters called Runic were made use of by the Teutonic nations, to which some would attribute an origin independent of the Greek and Latin alphabets. While the alphabets of the west-of Europe are derived from the Latin, the Russian, which is very complete, is based on the Greek, with some characters borrowed from the Armenian. The Sanskrit or Devanagari alphabet is one of the most remarkable alphabets of the world. As now used it has fourteen characters for the vowels and diphthongs, and thirty-three for the consonants, besides two other symbols. Our alphabet is a very imperfect instrument for what it has to perform, being both defective and redundant. An alphabet is not essential to the writing of a language, since ideograms or symbols may be used instead, as in Chinese.

There is a remarkable Indian alphabet which was invented by See-quah-yah, of the Cherokee tribe. This Indian was confined to his cabin by a swollen knee, and was set to thinking whether the mysterious power of the "talking leaf" was the gift of the Great Spirit to the white man or the discovery of the white man himself. His mind was directed to the mystery of speaking by letters, the name of which of course was not to be found in his language. From the cries of wild beasts, the sound of mocking-birds, the voices of his children and companions he observed that feelings and passions were conveyed by direct sound from one intelligent being to another. He immediately set about to ascertain all the sounds in the Cherokee language. In this labor he was aided by the more acute ears of his wife and children. At first he attempted to use pictorial signs, and images of birds and beasts to convey the different sounds in their language. He soon abandoned this method as difficult or impossible, and invented arbitrary signs without any regard to appearances, except such as might assist in recollecting them and distinguishing them from each other. His first alphabet consisted of about two hundred characters. This proved to be too cumbersome, and with the aid of his daughter, he reduced them at last to eighty-six, which number was used afterward. He perfected these characters in appearances, although he had no pen, making his characters on bark with a knife or nail. He sent to the Indian agent for paper and pen, made ink from the bark of the forest trees, and, after seeing the construction of the pen, he soon made a supply. His alphabet invented, he next proceeded to demonstrate to his people that he had made a discovery. His daughter, who was his only pupil, was sent out of hearing while he asked his friends to name a word or sentiment, which he put down. The girl was then called back and read what he had written. The father then retired, and the daughter wrote. This satisfied his companions of the discovery. Several of the brightest young men of the tribe were selected, to whom See-quah-yah communicated the mystery. This required some months, and at length they offered themselves for examination. The tribe watched for the results with anxiety. The youths were separated from their master and from each other and carefully watched. The uninitiated conducted the examination, which proved in every way successful. A great feast was ordered in honor of See-quahyah, who at once became philosopher and chief. He continued in his labors and discovered numbers. The U.S. Government had a font of type cut for his alphabet, and a newspaper called "The Cherokee Phœnix," printed, partly in the Cherokee language and partly in English, was established. Many of the Cherokees were able to read both languages.

Alphon'so, the name of a number of Portuguese and Spanish kings. The name is borne by the present ruler of Spain, Alphonso XIII, born May 17, 1886, nearly six months after the death of his father, Alphonso XII. He is a Bourbon, a descendant of Louis XIV of France.

**Alps**, the highest and most extensive mountain-chain in Europe, forming the water-shed between the river-systems of the Mediterra-

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5

nean Sea and the Atlantic Ocean. It includes parts of five countries; viz.: portions of northern Italy, southeastern France, southern Germany, western Austria-Hungary, and most of Switzerland. The range is about 600 miles long, and from 90 to 180 miles wide. Its average height is about 7,700 feet; the highest peaks are Mont Blanc, 15,781 feet, on the Franco-Italian border, and Monte Rosa, 15,-217, in Switzerland. The system of ranges is now commonly grouped under Eastern, Western, and Central Alps. The general form of the Alps is that of a crescent; from the principal chains spurs extend to the Apennines, the Vosges, the Harz, the Balkans, and the Carpathians. The line of perpetual snow begins at a line about 8,000 to 9,000 feet above the sea-level, more than 400 peaks rising to this altitude. From these peaks there descend to the valleys below enormous masses of partially melted snow and pulverized ice, constantly augmented by the masses from behind, which acquire a moving force that nothing can resist. Finally they reach a point where the sun melts them and become the sources of mountain rivers. The largest glacier is the "Mer de Glace" on the northern slope of Mont Blanc, and is 15 miles long, 3 to 6 miles wide, and 80 to 120 feet thick. The Rhône Glacier is one of the most famous. The Helvetian Alps in Western Switzerland, on both sides of the Rhone, are the portion most visited and afford the most beautiful mountain scenery of Europe. Among their peaks are the Jungfrau and the Finsteraar-horn. The dangerous ascent of Mont Blanc was first made in 1786 by a Frenchman, Jacques Balmat. The atmospheric conditions of the Alps produce at certain points most interesting optical illusions, sometimes very beautiful. The Alps were formerly considered well-nigh impassable, and many perished in the attempt. Hannibal's famous passage was reckoned one of his greatest feats. There are now good roads over most of the passes, some of which, however, are exceedingly dangerous.  $\mathbf{T}he$ chief passes connect Switzerland with Italy. and occupy 8 to 15 hours in crossing. One of the first famous roads was that built by Napoleon, 1803-10, over Mt. Cenis, at a height of 6,773 feet. The Mont Cenis tunnel, connecting France and Italy, is 14 miles from this road. It was built 1861-70 and is 74 miles The celebrated St. Gothard Pass is long. 6,935 feet high, and has been crossed by a carriage road since 1823. The great tunnel of St. Gothard, connecting Luzerne and Milan, is the longest in the world, 91 miles. At its central point it is 3,786 feet high. This tunnel was built 1872-82, by the contributions of Italy, Switzerland, and Germany. Other famous passes are the Col de Balme, celebrated for its view of Mont Blanc, the little St. Bernard, one of the oldest and easiest, and the Great St. Bernard, famed for its inn and dogs. The geological structure of the Alps has been a subject of interesting investigation, which was greatly aided by the building of the tunnels. Owing to their great height, the vegetation of the Alps is remarkably varied. At 6,500 feet all the vegetation of the plains has disappeared, including maize, cereals, common fruit, and forest trees. Between 7,500 and 8,500 feet a very rich pasturage and the peculiar "Alpine flora" appear. Animal life in many forms is abundant. Peculiar to Alpine regions are the chamois and the mountain goat.

Alsace-Lorraine, an imperial territory of the German Empire, ceded by France in 1871 as a result of the Franco-German war; area 5,668 sq. mi.; pop. 1,603,506; capital, Strasburg. The provinces of Alsace and Lorraine have been "debatable ground" between France and Germany for many centuries. In the ninth century they formed part of the kingdom of Lothar, grandson of Charlemagne, and ever since the partition of his dominions between France and the German Empire (869) portions of their territory, including as it does the borders of the two countries, have been the recurring subject of dispute, belonging to whichever power happened to have the mastery. At the close of the Roman period, in the fifth century, Alsace was filled up by Germanic settlers, and the population has remained distinctly Germanic ever since. It took its name from the river Ill, the settlers being called Ill-Sassen. In 924 Henry the Fowler annexed Alsace to the German Empire. During the tenth century it was claimed as a French possession, but never regained, and after the extinction of the Carolingian line it remained as an undisputed possession for several centuries. It was at various times an Alemannian or Sualian duchy. During the Reformation period a violent outbreak of the Alsatian peasantry was quelled (1525) by Duke Anthony III. Giselbert, Duke of Lorraine, had been attached to Charles the Simple of France, but during the disorders which marked the reign of that king, he voluntarily attached himself to the emperor Henry (925), the latter became his father-in-law, and Lorraine was formally incorporated in the empire, where it remained until 1734. Otto the Great gave the province to his brother Brun, Bishop of Cologne (952), Duke Conrad having re-belled and been subdued. It was afterward divided into Lower and Upper Lorraine. The former subsequently became known as Brabant, and was a possession of the Dukes of Burgundy. Upper Lorraine retained its name and became the modern province. About the middle of the eleventh century the emperor Henry III conferred it upon Gérard of Alsace, the founder of a long line of dukes who ruled it, for the most part, down to the eighteenth century. During the decadence of the empire and the supremacy of France under Louis XIII, Louis XIV, and Louis XV, parts of northern Lorraine were seized, including principally the bishoprics of Metz. Toul, and Ver-dun. During the latter part of the thirty years' war France sought to secure the Rhinelands, and by the treaty of Westphalia (1648) these three bishoprics, together with most of Alsace. were confirmed to Louis XIV. During the war of the Palatinate (1089-97) Louis XIV seized

more of the Rhine provinces, but was compelled to give much of it back to the empire by the treaty of Ryswick (1697). He retained the city of Strassburg, taken 1681, and had now acquired entire Alsace. After the war of the Polish Succession, the king of Poland, Stanislas Leszczynski, received Lorraine, which was to be annexed to France at his death. This occurred in 1766, and Lorraine became a part of France. At the Congress of Vienna (1814-15) Prussia sought to recover Alsace and Lorraine for Germany, but obtained only a small portion on the Rhine. In the Franco-German war of 1870-71, there was a strong national feeling in Germany for the recovery of these provinces, to which she was historically entitled, and here was the principal battle-ground. By the treaty of Frankfort, Germany recovered Alsace and German Lorraine, in general the part between the Vosges Mountains and the Moselle, together with Metz and the adjacent district. Alsace-Lorraine became a possession of the whole empire and not of any particular state, and is under direct control of the imperial government, vested in a provincial committee of 58 members. It has 15 seats in the Reichstag. The prevailing language is German, except in portions of Lorraine. Both languages are commonly understood. The German educational system is now well est**a**blished. Seventy-eight per cent. of the population is Roman Catholic. The soil is very fertile, producing principally grain, wine, and tobacco. The manufactures and mines of coal and iron are important

Al'sen, an island of Prussia on the east coast of Schleswig-Holstein. Pop. 22,500.

Attai Mountains (al'ti), an important Asiatic system on the borders of Siberia and Mongolia, partly in Russian and partly in Chinese territory. The highest summit is Byeluka, height 11,000 feet. The Altai is exceedingly rich in minerals, including gold, silver, copper, and iron. The inhabitants are chiefly Russians and Kalmuks. The chief town is Barnaul,

Altamu'ra, a town of south Italy, province of Bari, at the foot of the Apennines, walled, well built, and containing a magnificent cathedral. Pop 20,013.

Al'tenburg, a town of Germany, capital of Saxe-Altenburg. 23 miles south of Leipsic. It has manufactures of cigars, woolen yarn, gloves, hats, musical instruments, glass, brushes, etc. Pop. 26,241.

Alteratives (al'), medicines, as mercury, iodine, etc., which, administered in small doses, gradually induce a change in the habit or constitution, and imperceptibly alter disordered secretions and actions, and restore healthy functions without producing any sensible evacuation by perspiration, purging, or vomiting.

Al'tiscope, an instrument consisting of an arrangement of mirrors in a vertical framework, by means of which a person is enabled to overlook an object (a parapet, for instance) intervening between himself and any view that he desires to see, the picture of the latter being reflected from a higher to a lower mirror, where it is seen by the observer.

Al'titude, in mathematics the perpendicular height of the vertex or apex of a plane figure or solid above the base. In astronomy it is the vertical height of any point or body above the horizon. It is measured or estimated by the angle subtended between the object and the plane of the horizon, and may be either *true* or *apparent*. The *apparent* altitude is that which is obtained immediately from observation; the *true* altitude, that which results from correcting the apparent altitude, by making allowance for parallax, refraction, etc.

Alton, Madison co., Ill., on Mississippi River, 15 mi. n.w. of St. Louis. Railroads: Chicago & Alton; C. C. C. & St. L. (Big 4); Burlington, Keokuk & Northwestern; C. B. & Q.; M. K. & T.; C. St. L. & St. P. (Bluff Line). Industries: glass, three flouring-mills, iron foundry, woolen-mill, plow company, two carriage factories, lime and cement works, firebrick, tile works, powder-mill, packing, and mining-tool works. Alton became a city in 1837. Pop. est. 1897, 15,000.

**Al'tona**, an important commercial city in the Prussian province of Schleswig-Holstein, adjoining Hamburg, with which it virtually forms one city. It is a free port, and its commerce, both inland and foreign, is large, being quite identified with that of Hamburg. Pop. 104,717.

Altoo'na, Blair co., Pa., at the eastern base of the Alleghanies, 244 mi. w. of Philadelphia, with large machine-shops and locomotive factories. Pop. 30,337.

Al'torf, a small town of Switzerland, capital of the canton of Uri, beautifully situated, near the Lake of Luzern, amid gardens and orchards, and memorable as the place where, according to legend, William Tell shot the apple from his son's head. A colossal statue of Tell now stands here. Pop. 2,900.

Alto-Rillevo (àl' tō-rē-lē-ā"vo) "high reiief," a term applied in regard to sculptured figures to express that they stand out boldly from the background, projecting more than half their thickness, without being entirely detached. In mezzo-rilievo, or middle relief, the projection is one half, and in basso-rilievo, or basrelief, less than one half. Alto-rilievo is further distinguished from mezzo-rilievo by some portion of the figures standing usually quite free from the surface on which they are carved, while in the latter the figures, though rounded, are not detached in any part.

Alum is a crystalline compound containing the metals aluminum and potassium, together with sulphuric acid and water. A. is prepared from a bituminous shale containing iron pyrites interspersed throughout its mass, found in the Lower Coal Measures, and technically called *alum ore*. In preparing A. from the ore, the latter is first roasted—that is, heated in contact with air. By this roasting the iron pyrites is oxidized to sulphate of iron, and sulphuric anhydride, which combines with the aluminum. The roasted mass is
treated with water to dissolve out the two sulphates, and the solution obtained by this means evaporated to a suitable consistency. and mixed with chloride of potassium. A. and chloride of iron result, the former of which, being less soluble than the latter, is readily separated by crystallization. A. is a colorless crystalline substance of very astringent acid taste. Its solution reddens litmus. It is largely employed by dyers as a mordant. It is also used In preparing pigments called lakes. A. is used in medicine, and has been employed as an an-tiseptic. It is sometimes used to adulterate flour intended for making bread, as it appears to give the bread a firm consistency and white color. Burnt A. is A. from which the water has been driven off by heat.

Alumbagh (*a*-lam-biig'), a palace and connected buildings in Hindustan, about 4 mi. s. of Lucknow, famous for its capture and defense by the British in the Indian mutiny.

Alu'mina, the single oxide of the metal aluminium. As found native it is called corundum; when crystallized, ruby or sapphire; when amorphous, emery. It is next to the diamond in hardness. In combination with silica it is one of the most widely distributed substances, as it enters in large quantity into the composition of granite, traps, slates, schists, clays, loams, and other rocks. The porcelain clays and kaolins contain about half their weight of this earth, to which they owe their most valuable properties. It has a strong affinity for coloring matters, which causes it to be employed in the preparation of the colors called *lakes* in dyeing and calico-printing. It combines with the acids and forms numerous salts, the most important of which are the sulphate and acetate, the latter of extensive use as a mordant.

Alumin' ium, a metal discovered in 1827, but nowhere found native, though as the base of adumina (which see) it is abundantly dis-tributed. The mineral cryolite—a fluoride of aduminium and sodium—which is brought from Greeuland, is one of the chief sources of aduminium. It is a shining white metal, of a color between silver and platinum, very light, weighing less than glass, and about one-fourth of silver (specific gravity, 2.56 cast, 2.67 hammered), not liable to tarnish or undergo oxidation in the air, very ductile and malleable, and remarkably sonorous. It forms several useful alloys with iron and copper; one of the latter (aluminium gold) much resembles gold, and is made into cheap trinkets. Another, known as aluminium bronze, possesses great hardness and tenacity.

The process of extracting aluminium from clay requires a very flerce heat or a powerful electric current. In some of the factories an electric current of 14,000 amperes and 30 volts is generated. This terrific current is run into the reduction machines by means of heavy copper wires. The reduction machine consists of a huge crucible made of carbon blocks so as to be infusible. In the bottom of the crucible is a small tap-hole where the melted aluminum may be drawn out. The electrode

is constructed of heavy carbon plates so as to form a prism. This is fastened by a chain to a derrick and can be lowered into the crucible or furnace as fast as its end burns off. Before the process begins, chunks of copper are thrown into the crucible to form the negative electrode, then the purest obtainable alumina or clay is shoveled into the holes. The moment the electrode is lowered the connection is made and the terrific heat thus produced causes the alumina to give up its aluminium, which may be drawn off through the tap-hole. The clay is fed into the crucible as fast as the reduction process goes on and until the electrode has been entirely consumed. An ordinary aluminium furnace will produce about four hundred-weight in twenty-four hours, and about fifteen horse-power is necessary for each pound of aluminium produced per hour. Aluminium factories produce immense volumes of poisonous gases and for that reason must be more or less isolated. The uses of aluminum are many and various. Aluminum was first used in making aluminum bronze; it is used also for medals and household utensils, jewelers' novelties, parts of bicycles, scientific and surgical instruments, chains for use in mining machinery (because acid water does not eat nor rust it), barbers' supplies, umbrella and cane sticks. The largest quantity of alu-minium is used in making steel. Manufacturers use it in making bath tubs, and shoe dealers build up the heels of shoes with the metal. Great war vessels are being finished in aluminium, and France has built an aluminium torpedo boat. It is used for the manufacture of cash registers, artificial limbs, horse shoes, ornaments for coffins, elevators, chafing-dishes, and dental plates. The two difficulties of using the metal extensively are those of soldering and tempering it.

Alum-root, the name given in America to two plants on account of the remarkable astringency of their roots, which are used for medical purposes.

Alum-slate, a slaty rock from which much alum is prepared; color, grayish, bluish, or iron-black; often possessed of a glossy or shining luster; chiefly composed of clay (silicate of alumina), with variable proportions of sulphide of iron, lime, bitumen, and magnesia.

Alum-stone, a mineral of a grayish or yellowish-white color, approaching to earthy in its composition, from which (in Italy) is obtained a very pure alum by simply subjecting it to roasting and lixiviation.

Al'va (or Al'ba), FERDINAND ALVAREZ, Duke of (1508-1582), Spanish statesman and general under Charles V and Philip II; fought in the wars of Charles V in France, Italy, Africa, Hungary, and Germany. He is remembered for his bloody and tyrannical government of the Netherlands (1567-73), which had revolted, and which he was commissioned by Philip II to reduce to entire subjection to Spain. Among his first proceedings was to establish the "Council of Blood," a tribunal which condemned all whose opinions were suspected, and whose riches were coveted. Many mer-

chants and mechanics emigrated to England. The counts Egmont and Horn, and other men of rank, were executed, and William and Louis of Orange had to save themselves in Germany. Resistance was quelled for a time, and the provinces of Holland and Zealand revolted against his tyranny. A fleet which was fitted out at his command was annihilated, and he was everywhere met with insuperable courage. He was recalled, and in 1573 heleft the country, in which, as he boasted, he had executed 18,000 men. He was received with distinction in Madrid. Before his death he reduced all Portugal to subjection to his sovereign. It is said that during sixty years of warfare he never lost a battle and was never taken by surprise.

Alvarado ( $\dot{a}l$ - $\dot{a}$ - $\ddot{a}$ ' $d\ddot{o}$ ), PEDRO DE, one of the Spanish "conquistadors," was born toward the end of the fifteenth century, and died in 1541. Having crossed the Atlantic he was associated (1519) with Cortez in his expedition to conquer Mexico; and was intrusted with important operations. In July, 1520, during the disastrous retreat from the capital after the death of Montezuma, the perilous command of the rear-guard was assigned to Alvarado. On his return to Spain he was received with honor by Charles V, who made him governor of Guatemala, which he had himself conquered. To this was subsequently added Honduras. He continued to add to the Spanish dominions in America till his death.

**Alwar** (al-war'), a state of northwestern Hindustan, in Rajputana. Area 3,024 sq. mi. This semi-independent state has as its ruler a rajah with a revenue of about \$1,000,000; military force, about 5,000 infantry and 2,000 cavalry. Pop. 682,928.—ALwAR, the capital, is situated 80 mi. s.s.w. of Delhi. Pop. 49,867.

Amade'us, Duke of Aosta, second son of Victor Emmanuel of Italy, and brother of the present king, was born in 1845, and was chosen by the Cortes king of Spain in 1870, Queen Isabella having had to leave the country in 1868. His position was far from comfortable, however, and perceiving that, as a member of a foreign dynasty, he had little hope of becoming acceptable to all parties in the state, he abdicated in 1873 and returned to Italy.

Amal'ekites, a Semitic race occupying the peninsula between Egypt and Palestine, named after a grandson of Esau. They were denounced by Moses for their hostility to the Israelites during their journey through the wilderness, and they seem to have been all but exterminated by Saul and David.

Amal'fi, a seaport in southern Italy, 23 mi. from Naples, formerly a place of great commercial importance, in the Middle Ages enjoying a republican constitution of its own. Here arose the Amalfan Code of maritime law. Pop. 7,737.

Amal gam, a name applied to the alloys of mercury with the other metals. One of them is the amalgam of mercury with tin, which is used to silver looking-glasses. Mercury unites very readily with gold and silver at ordinary temperatures, and advantage is taken of this to separate them from their ores, the process being called *amalgumation*. The mercury being properly applied dissolves and combines with the precious metal and separates it from the waste matters, and is itself easily driven off by heat.

Amarapura (a-ma-ra-pö'ra), a deserted city, once the capital of the Burmese Empire, on the left bank of the Irrawaddy, 10 mi. n.e. of Ava. In 1810 it was completely destroyed by fire, in 1839 it was visited by a destructive earthquake. In 1857 the seat of government was removed to Mandalay. The population in 1800 was 175,000.

Amaryllida 'Ceee, an order of plants, generally bulbous, with a highly colored flower, natives of Europe and most of the warmer parts of the world. The order includes the snowdrop, the snow-flake, the daffodil, the belladonna-lily, the so-called Guernsey-lily (probably a native of Japan), the Brunsvigias, the blood-flowers of the Cape of Good Hope, different species of Narcissus, Agave (American aloe), etc. Many are highly prized in gardens and hothouses; the bulbs of some are strongly poisonous.

Amasia (à-mà-sẽ'à), a town in the north of Asia Minor, on the Irmak, 60 miles from the Black Sea, surmounted by a rocky height in which is a ruined fortress; has numerous mosques, richly-endowed Mohammedan schools, and a trade in wine, silk, etc. Amasia was a residence of the ancient kings of Pontus. Pop. 25,000.

**Ámati** ( $\dot{a}$ -m $\ddot{a}'t\tilde{c}$ ), a family of Cremona who manufactured violins in the sixteenth and seventeenth centuries. Most of the violins made by them are of comparatively small size and flat model, and the tone produced by the fourth or G string is somewhat thin and sharp. Many of Niccolo Amati's violins are, however, of a larger size and have all the fulness and intensity of tone characteristic of those manufactured by Stradivario and Guarnerio.

Amatit'lan, a town in Central America, state of Guatemala, about 15 miles south of the city of Guatemala, a busy modern town, the inhabitants of which are actively engaged in the cochineal trade. There is a small lake of same name close to the town. Pop. 12,000.

Amauro'sis, a species of blindness, formerly called guttaserena (the "drop serene," as Milton, whose blindness was of this sort, called it), caused by disease of the nerves of vision. The most frequent causes are a long-continued direction of the eye on minute objects, long exposure to a bright light, to the fire of a forge. to snow, or irritating gases, overfulness of blood, disease of the brain, etc. If taken in time it may be cured or mitigated; but confirmed amaurosis is usually incurable.

Am'azon, a river of South America, the largest in the world, formed by a great number of sources which rise in the Andes; length, including windings, between 3,000 and 4,000 mi.; area of drainage basin 2,300,000 sq. mi. It enters the Atlantic under the equator by a mouth 200 miles wide. In

its upper course navigation is interrupted by rapids, but from its mouth upward for a distance of 3,300 mi. (mostly in Brazil) there is no obstruction. It receives the waters of about 200 tributaries, 100 of which are navigable, and seventeen of these 1,000 to 2,300 miles in length. The Amazonian water system affords some 50,000 miles of river suitable for navigation. The rapidity of the river is considerable, especially during the rainy season (January to June), when it is subject to floods; but there is no great fall in its course. The tides reach up as far as 400 miles from its mouth. The singular phenomenon of the bore, or as it is called on the Amazon the pororoca, occurs at the mouth of the river at spring-tides on a grand scale. The river swarms with alligators, turtles, and a great variety of fish. Steamers and other craft ply on the river, the chief center of trade being Para, at its mouth. The Amazon was discovered by Yanez Pincon in 1500, but the stream was not navigated by any European till 1540, when Francis Orellana descended it. Orellana stated that he found on its banks a nation of armed women, and this circumstance gave the name to the river.

**Amaz'onas,** the largest province of Brazil, traversed by the Amazon and its tributaries. Area 753,000 sq. mi.; pop. 80,000.

Area 753,000 sq. mi.; pop. 80,000. **Amazons**, according to an ancient Greek tradition, the name of a community of women, who permitted no man to reside among them, fought under the conduct of a queen, and long constituted a formidable state. They were said to burn off the right breast that it might not impede them in the use of the bow. Several nations of Amazons are mentioned, the most famous being those who dwelt in Pontus, who built Ephesus and other cities. Their queen, Hippolyta, was vanquished by Hercules. They attacked Attica in the time of Theseus. They came to the assistance of Troy under their queen, Penthesilëa, who was slain by Achilles.

Amazu'lu. See Zulus.

**Amba'ia** (Umball'a), a town of India, in the Punjab, with a flourishing trade in grain and other commodities. Total pop. 67,463.

Ambas' sador, a minister of the highest rank, employed by one prince or state at the court of another to manage the public concerns, or support the interests of his own prince or state, and representing the power and dignity of his sovereign or state. Ambassadors are ordinary when they reside permanently at a foreign court, or extraordinary when they are sent on a special occasion. When Ambassadors extraordinary have full powers, as of concluding peace, making treaties, and the like, they are called plenipotentiaries. Ambassadors are often called simply ministers. Enroys are ministers employed on special occasions, and are of less dignity than ambassadors. Until recently the U.S. sent no ambassadors to foreign countries, but were represented by ministers-plenipotentiary, ap-pointed by the president, with approval of the Senate. In 1896 the ministers to Germany,

France, England, and Italy were raised to the rank of ambassadors.

Amba'to, a town of Ecuador, on the side of Chimborazo, 70 mi. s. of Quito. Pop. 12,000.

Am ber, a semi-mineral substance of resinous composition, a sort of fossil resin, the produce of extinct Coniferæ. It is usually of yellow or reddish-brown color; brittle; yields easily to the knife; is translucent, and possessed of a resinous luster. It burns with a yellow flame, emitting a pungent, aromatic smoke, and leaving a light carbonaceous residue, which is employed as the basis of the finest black varnishes. By friction it becomes strongly electric. It is found in masses from the size of coarse sand to that of a man's head, and occurs in beds of bituminous wood situated upon the shores of the Baltic and Adriatic Seas; also in Poland, France, Italy, and Denmark. It is often washed up on the Prus-sian shores of the Baltic, and is also obtained by fishing for it with nets. Sometimes it is found on the east coast of Britain, in gravel pits round London, also in the U.S.

Working in Amber. - The amber blocks are sawed into small blocks by an extremely thin saw. With the amber rough-shaped the worker puts in his lathe a disk file, a circular steel plate with radiating file sections on its face, thus the amber is reduced to the desired size. In making the mouthpiece for a pipe, for instance, the blocks of amber, after being brought nearly to the finished shape, are put in the lathe to be bored out. As the hole must be drilled in the exact center, the amber must be truly centered in the lathe. The hole for the bone screw which joins the mouthpiece and the pipe stem is bored out, and a screw thread cut in with a toothed tool. A curious thing about amber is that it will crack if a hole is bored straight through from one end. After the hole is bored the amber is brought down to the right size for the particular pipe stem for which it is intended and is then polished. Some of the mouthpieces are curved and this is done after the amber is shaped and bored. The straight mouthpiece is put into hot oil until it loses its stiffness and is then bent as desired. Rubber and horn mouthpieces are worked much as amber, but the tools employed are stronger and heavier. Amber is sold by the pound, the price vary-ing from \$2 to \$75 per pound. There is no difference, so far as cost is concerned, between the clouded and the clear amber. Amberine is an imitation of amber as its name implies. It is tougher and stronger than amber.

Am bergris, a substance derived from the intestines of the sperm-whale, and found floating on or near the shore; yellowish or blackish white; very light; melts at  $140^{\circ}$ , and is entirely dissipated on red-hot coals; is soluble in ether, volatile oils, and partially in alcohol, and is chiefly composed of a peculiar fatty substance. Its odor is very agreeable, and hence it is used as a perfume.

**Ambleteuse** (an-bl-teuz), a small seaport of France, 6 mi. from Boulogne. Here James II landed on his flight from England in 1688;







TYPE OF AMERICAN INDIANS. I. Eskimo Woman (Labrador). 2. Mexican (Coast). 3. Mexican (Highl 9, 10. Apache (U. S. A.) II. Bellaccola or Bilchula. 12, 13. Pueblo (U. S. A.). 14, 15. Zapoteca (Mexico). 16, 17. Ca del Fuego. 23. Patagonian Woman.



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(pande). 4. Merican Woman (Yucatan). 5. Indian (Ecuador). 6. Indians (Peru), 7. Ipurina (Brasil). 8. Sioux. ( Main. 18. Botokudin. 19. Umana or Omagua (Brasil). 20. Araucanian (Chile). 21, 23. Woman and Child of Terra

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and from its harbor Napoleon I prepared to despatch a flotilla of flat-bottomed boats for the invasion of Britain.

Amblyop'sis, a genus of blind fishes, containing only one species, found in the Mammoth Cave of Kentucky.

Amboy'na (Amboina, or Apon), one of the Molucca Islands in the Indian Archipelago, close to the large island of Ceram; area about 280 sq. mi. Here is the seat of government of the Dutch residency or province of Amboyna, which includes also Ceram, Booro, etc. It affords a variety of useful trees, including the cocoa-nut and sago palms. Cloves and nutmegs are the staple productions. The natives are mostly of Malayan race. The capital, also called Amboyna, is situated on the Bay of Amboyna, and is well built and defended by a citadel. The streets are planted on each side with rows of fruit-trees. It is a free port. Pop. 10,500. In 1607 Amboyna and the other Moluccas were taken by the Dutch from the Portuguese, and it was for some years the seat of government of the Dutch East Indies. Trade with the Moluccas was secured to the British by treaty in 1619, but the British establishment was destroyed and several persons massacred in 1023, an outrage for which no satisfaction was obtained till 1654 by Cromwell. Amboyna was taken by the British in 1796 and 1810, but each time restored to the Dutch. Pop. 30,000.

Amboyna Wood, a beautiful curled orange or brownish colored wood brought from the Moluccas.

Ambulance, a four or two wheeled wagon fitted up for the conveyance of injured persons. In the armies of the world the term is applied to movable field hospitals, especially those controlled by the Red Cross Society. Every principal city in America has its hospitals and police departments equipped with excellent ambulances in the charge of qualified surgeons. These vehicles having the right of way over other vehicles, respond to accident calls sent by the police, and render most efficient first aid to the injured as well as conveying them to hospitals or their homes. Ambulances are also provided for the conveyance of injured animals.

Amend ment, a proposal brought forward in a meeting of some public or other body, either in order to get an alteration introduced on some proposal already before the meeting, or entirely to overturn such proposal. When amendments are made in either house of Congress upon a bill which passed the other, the bill, as amended, must be sent back to the other house. The Senate may amend money bills passed by the House of Representatives, but cannot originate such bills. The Constitution of the U. S. contains a provision for its amendments, as follows :--

"The Congress, whenever two thirds of both houses shall deem it necessary, shall propose amendments to this constitution; or, on the application of the legislatures of two thirds of the several states, shall call a convention for proposing amendments, which, in either case, shall be valid to all intents and purposes, as part of this constitution, when ratified by the legislatures of three fourths of the several states, or by conventions in three fourths thereof, as the one or the other mode of ratification may be proposed by the Congress; provided, that no amendment which may be made prior to the year 1808 shall in any manner affect the first and fourth clauses in the ninth section of the first article; and that no state, without its consent, shall be deprived of its equal suffrage in the Senate."

Amer' ica, or the New World, the largest of the great divisions of the globe except Asia, is washed on the west by the Pacific, on the east by the Atlantic, on the north by the Arctic Ocean, on the south tapers to a point. On the northwest it approaches within about 50 mi. of Asia, while on the northeast the island of Greenland approaches within 370 mi. of Iceland. America as a whole forms the two triangular continents of North and South America, united by the narrow Isthmus of Panama, and having an entire length of about 10,000 miles: a maximum breadth (in North America) of 3,500 miles; a coast line of 44,000 miles; and a total area, including the islands, of nearly 16,000,000, of which North America contains about 9,000,000 sq. mi. South America ica is more compact in form than North America, in this respect resembling Africa, while N. America more resembles Europe. Between the two on the east side is the great basin which comprises the Gulf of Mexico, the Caribbean Sea, and the West India Islands. Like Europe also N. America possesses numerous islands, while those of S. America are less important and confined almost to the southern extremity.

NORTH AMERICA.—The political divisions of N. A. are, the U. S. (including Alaska), Mexico, Canada, Greenland, and the Bermuda Islands.

Surface, Rivers, and Lakes.—North America naturally divides itself into five physical regions: 1. The table-land of Mexico, with the strip of low country on its eastern and western shores; 2. The plateau lying between the Rocky Mountains and the Pacific Ocean, a country with a mild and humid atmosphere as far north as the 55th parallel, but inhospitable and barren beyond this boundary; 3. The great central valley of the Mississippi, rich and well wooded on the east side; bare but not unfertile in the middle; dry, sandy, and almost a desert on the west; 4. The eastern declivities of the Alleghany Mountains, a region of natural forests, and of mixed but rather poor soil; 5. The great northern plain beyond the 50th parallel, four fifths of which is a bleak and bare waste, overspread with innumerable lakes, and resembling Siberia both in the physical character of its surface and the rigor of its climate. The loftiest mountains in N. America are Wrangell in Alaska. 20,000 ft.; Mount St. Elias, 19,500 ft.; and Popocatepetl, 17,783 ft. The principal river systems are the Mississippi, the St. Lawrence, the Mackenzie, and the Rio del Norte. The





Mississippi River system is, next to the Amazon, the largest in the world. It receives as tributaries the Missouri, the Ohio, the Arkansas, and the Red River, draining a total territory of about one million and a half sq. mi. This river system is separated from the Mackenzie River system by a low plateau which stretches across the country near the Canadian lakes. The Mackenzie flows into the Arctic Ocean. A part of this territory north of the lakes is drained by numerous small rivers which empty into Hudson Bay. The third great river system is the St. Law-rence, which is the outlet of the five great lakes. It has a drainage area of about 400,000 sq. mi. The Rio del Norte flows into the Gulf of Mexico, draining an area of about 200,000 sq. mi. The principal rivers emptying into the Pacific Ocean are the Columbia, the Colorado, the Sacramento, and the Frazer. The Yukon, in Alaska, empties into Bering Sea. The principal indentations of the coast of North America are Hudson Bay, the Gulf of St. Lawrence, the Gulf of Mexico, Long Island Sound, the bays of Fundy, Cape Cod, Delaware, and Chesapeake, and the Gulf of California and San Francisco Bay and Puget Sound.

Geology.- If we run a line westward across the continent of North America at the latitude of Delaware Bay (38<sup>°</sup>), the geological formations present themselves in the follow-ing order: 1. Tertiary and Cretaceous strata on the shores of the Atlantic; 2. Gneiss underlying these strata, and presenting itself on the eastern slope of the Alleghany or Appalachian mountains, but covered in parts by new Red Sandstone: 3. Palæozoic rocks, consisting of Silurian, Devonian, and Carboniferous strata, curiously bent into parallel foldings, with synclinal and articlinal axes, the crests of the latter forming the ridges of the Alleghany Mountains, which in this region rise to the height of 2,500 feet. Upon these Palæozoic rocks rest three great coal-fields-the Appalachian, that of Illinois, and that of Michigan. covering a large portion of the space between the Alleghanies and the Mississippi, and embracing collectively an area equal to the surface of Great Britain. From the Mississippi westward to Utah the Palæozoic rocks occur in great folds, between which are extensive areas of Triassic, Oolitic, Cretaceous, and Tertiary beds. In California the rocks are chiefly metamorphosed secondary strata on which lie patches of Tertiary sediments. In British America there is an enormous development of the Laurentian and Huronian rocks, which are the oldest yet discovered, and occupy most of the country immediately north of the large lakes. Newfoundland and the neighboring British territories consist of Pre-Silurian, Silurian, Devonian, Carboniferous (which includes coal-fields of considerable extent), and Triassic rocks. The area north of about  $40^\circ$  n. is also covered and strewed with glacial drift and boulders.

The Ozark Mountains resemble the Alleghanies in their mineral structure, containing the

same rocks from the granite to the carboniferous, and probably upward to the chalk. The mineral products of N. A. are of une-qualed richness and variety. Gold is abundant in California, Nevada, and Montana. It is also found in British Columbia, Mexico, Alaska, and Canada, and sparingly in Virginia and South Carolina. Silver is obtained from Mexico, California, and Newfoundland. Great masses of almost pure copper are found in the Huronian rock strata, the north and east shores of Lake Superior being the richest of copper mining regions; while New York and Indiana possess a share of the same metal, and it is found in different countries from British Columbia to the isthmus. The iron ores of Pennsylvania, and those of Canada, including New Brunswick, are of the greatest importance; the former are rendered more available by their occurring close to the beds of bituminous coal, giving materials for the manufacturing industry of Pittsburg; while anthracite coal is obtained from the eastern districts of Pennsylvania. It is estimated that one third of the total area of this state is occupied by coal-fields, which can scarcely be exhausted. Lead is found in Wisconsin, Illinois, and Missouri, in New York, in Canada, in California; white zinc is got from Arkansas and New Jersey. Reverting to the subject of coal, as having an intimate economic connection with all metallic wealth, it should be observed that the united area of all the coalfields in the U.S. is estimated at 190,000 sq. mi., exceeding twenty-fold those of Europe. The chief of these coal-fields are, first, the Appalachian, extending from the Susque-hanna in Pennsylvania to the Tuscaloosa in Alabama, along the west side of the Alleghany Mountains; the area of this coal-field is 70,-000 sq. mi., and its greatest thickness 2,500 feet; secondly, the coal-field of Michigan, about the center of that state; thirdly, the extensive coal-field between the Ohio and the Mississippi, across the states of Indiana and Illinois: lastly, the lowa and Missouri coalfield. Coal is found also in Nova Scotia, in British Columbia, and Vancouver Island, and wherever the Upper Palæozoic strata prevail in the geological structure.

Climate.-The climate of N. A. varies from the tropical to the frigid. Mexico is hot. moist, and unhealthy on the low coast, but the greater part of its area, comprising all the populous district, is a table-land from 5,000 to 9,000 feet in height. In consequence of this, Mexico, though half of it is within the torrid zone, has a temperate and equable climate. The mean heat of the capital (7,400 feet above the sea) is  $62\frac{3}{2}$ . The difference between the warmest and the coldest month is only 12°. In the extensive region lying between the parallels of 30° and 50° n., which comprehends three fourths of the useful soil of N. A., we have three well-marked varieties of climate, that of the east coast, the west coast, and the basin of the Mississippi. On the east coast, from Georgia to Lower Canada, the range of the thermometer is very great, the summer





being hot and the winter cold. At Quebeo the temperature of the warmest month exceeds that of the coldest by no less than  $60_1^{\circ}$  F. The climate undergoes a more rapid change in America as we proceed from south to north, a degree of latitude in the middle of the temperate zone producing a decrease of annual temperature of 1°.57 F. At the mouth of Columbia River, in latitude  $46_1^{\circ}$  n., the mean heat of the warmest monthwas about  $62^{\circ}$  F., of the coldest about  $36^{\circ}$ , and of the whole year 51°. The place is under the same latitude with Quebec, where the snow lies five months, and the mean temperature during the three winter months is 18° below the freezing point. This single circumstance marks emphatically the contrast in the climate of the east and west coasts of N. A.

Vegetation.-North America is rich in forests of pine, oak, ash, hickory, beech, walnut, maple, cedar, cypress, juniper, hemlock, bass-wood, palmetto, dogwood, willow, elm, sycamore, magnolia, gum, locust, and other trees. Perhaps the most important plant is the maize or Indian corn. Corn is raised mostly in the central part of the U. S., and is the principal product of many of the prairie states. Wheat. barley, peas, oats, and rice are cultivated throughout the greater portion of the continent. Vanilla, pimento, jalap, cinchoua, to-bacco, sweet potatoes, and the cactus are grown in various parts, and are mostly indigenous. All kinds of vegetables and fruits are grown. The orange, lemon, apple, peach, and pear are grown very extensively. Coffee, sugar, and cotton are staple products. The potato is a native of both North and South America and is raised in great quantity.

Zoology.-The animals of N. A. include the polar, black, and grizzly bears in the Arctic regions and Rocky Mountains. Also the cougar, or panther, lynx, and wildcat. Formerly the buffalo, or bison, roamed over the prairies in great herds but it is now almost extinct. Other animals are the musk-ox, the moose, reindeer, antelope, wolves, dogs, and foxes. Among the smaller animals are beaver, otter, raccoon, badger, opossum, weasel, hare, muskrat, squirrel, porcupine, gopher. There are numerous species of reptiles, the rattlesnake being among the most dangerous. In the southern part of the U.S. and in Mexico are found the alligator, boa-constrictor, tortoise, sea-turtle, toad, frog, and lizard. There are a great many birds found which are peculiar to this continent. The wild turkey, one of the principal native birds, has now almost disappeared. Wild pigeons are still found in some localities. Other birds are the bald eagle, sparrow-hawk, swallow-tail hawk, falcon, vulture, turkey-buzzard, and owl. Among the smaller birds are turkeys, pheasants, grouse, and quails; also cranes, herons, fla-mingoes, spoonbills, rails, and gallinules. The mingoes, spoonbills, rails, and gallinules. principal water fowls are swans, wild geese, ducks, and pelicans, Some of the smaller birds are larks, orioles, buntings, magpies, jays, cedar birds, thrushes, shripes, mocking birds, robins, grossbeaks, bluebirds, parrots,

woodpeckers, humming - birds, klngfishers, whip-poor-wills. The principal varieties of fish are sturgeon, salmon-trout, shad, white fish, mackerel, herring, halibut, sheeps-head, salmon, bass, perch, pike, blue fish, suckers. The domestic animals are horses, cattle, sheep, and swine.

Population. - The inhabitants of N. A., when it was discovered by Europeans, were Indians of whom many are still in existence, though they are fast disappearing before the advance of civilization. Whence came the aborigines of America no one can say definitely, but the best authorities agree that they came from Asia. The Indians living in N. A. at the present time are, in the extreme northern parts, the Esquimaux; a few in the U.S., located in the Indian Territory, and some on small reservations in various states, and in Mexico. When the Europeans first came to this continent the various tribes of Indians were scattered over the whole continent. Some of the Indians had made great advances in a rude sort of civilization, dwelling in large and wellbuilt houses and having a settled form of government, practising agriculture and to some extent the mechanical arts. The white population of the continent is mainly of British origin though to considerable extent it consists of Germans, Scandinavians, and the de-scendants of such. There may also be found representatives of nearly every race and na-tion on the face of the globe. The African race constitutes an important part of the population especially in the southern part. It consists of freed slaves and the descendants of slaves.

History.— America was first made known to the world by the discovery of Christopher Columbus who set sail from Spain in August, 1492. The continent of North America was first discovered by John Cabot and his son Se-bastian, in 1497. The new world was named after Amerigo Vespucci who was the first to write a description of it. Various voyages were made from Europe, the principal ones being by Gaspar de Cortereal, a Portuguese sailor, who made two voyages to the coast of Labrador; Ponce de Leon, who discovered Florida in 1512; Verrazzano, a Florentine sailor, who explored more than 2,000 miles of the eastern coast; Jacques Cartier, who explored Newfoundland and descended the St. Lawrence; Cortez. who discovered and con-quered Mexico. The first English settlers in what is now the U. S. came in 1607, locat-ing in Jamestown, Va. From time to time From time to time colonies came from England, Holland, and France and made settlements along the eastern coast, from Florida to Quebec. At times expeditions were made inland, and in the course of 150 years settlements were made on the Great Lakes and in the Mississippi Valley. By 1776 the English owned most all of the settlements except those of Quebec and Florida. In that year the English colonies established an independent American Commonwealth. In 1821 Mexico became independent of Spain, forming a republic. The remainder of N. A.,



#### America

except the peninsula of Alaska, which belongs to the U. S., and Greenland, which is a Danish possession, belongs to Great Britain.

CENTRAL AMERICA extends from the Isthmus of Panama to the Isthmus of Tehuantepec. Its entire length is about 800 mi., with a breadth varying from 25 to 350 mi. Its area is about 190,000 sq. mi. The political divisions of Central America are Guatemala, Honduras, San Salvador, Nicaragua, Costa Rica, and British Honduras.

Surface, Rivers, and Lakes.-The surface of Central America is for the most part mountainous. North of Panama is the plateau of Veragua, the highest point of which is 8,000 The plateaus of Costa Rica and Cartago ft. lie north of this. There are several peaks of 10,000 ft. in height. These plateaus gradually slope down to the plain of Nicaragua, north of which rises the table-land of Honduras with an average height of 4,000 ft. South of this region are two rows of volcanoes. The plateaus of Honduras and Guatemala are connected by a single mountain. In the plateau of Guatemala are several volcanoes over 12,000 ft. in height. Among the rivers of Central America which are considerable in size though short, are the Usumasinta and the San Juan, the outlet of Lake Nicaragua. On the east coast is the Gulf of Honduras, and on the west the Bay of Panama, the Gulf of Dulce, Coronada Bay, Gulf of Nicoya, and the Gulf of Fonseca. The lakes are: Nicaragua, area 34,000 sq. mi., Managua in Nicaragua, Illopongo, Amatitlan, and the Yojoa.

Geology.—In the central part are the crystalline and volcanic rocks, on either side of which are strata of the Tertiary Age. Gold, silver, lead, and mercury are found in many places and especially in Costa Rica and Honduras. The only hindrance to the working of these mines is the unhealthy climate. Jasper and marble are also found in Honduras and large quantities of salt are produced on the western coast, and also from the numerous salt springs.

Climate.—There are only two seasons in Central America, the wet and the dry. During the wet season the skies are filled with clouds and falling rain and the sun is seldom seen. During the dry season the temperature does not rise so high, but hot and dry weather prevails, and the atmosphere is clear and healthy. The higher regions are more open and are comparatively healthy, but many contagious diseases prevail in the low marshes.

Vegetation.—Central America is rich in the growth of vegetables and tropical fruits, among which are sugar-cane, indigo. Indian corn, sweet potatoes, tobacco, cacao, the cactus, mandioca, and banana. There are large forests of mahogany, logwood, lignum-vitæ, pimento, sarsaparilla, vanilla, black balsam, etc. There are about one hundred different kinds of trees in the forests of Panama that are fatal to animal life.

Zoology.—There is very little difference between the zoology of C. A. and the other divisions of the continent. There are many

#### America

species of humming-birds and quezal. The birds are noted for their brilliant plumage. There are many large and dangerous serpents, also a brown and green species of locust. The rivers and lakes are rich in fish.

Population.—The inhabitants of C. A. are the descendants of the Spaniards who settled there centuries ago, and some Indians and creoles. There are also a few blacks. In general the people of these hot republics are quarrelsome.

*History.*—Columbus visited the east coast of C. A. in 1502, passing along the shores of Honduras and Costa Rica. In 1523 Cortez sent one of his lieutenants to conquer this region which he did in two years' time. The whole territory belonged to Spain from that time until 1823 when it became a republic. In 1833 this republic was dissolved and the five extant republics were formed. The only European possession is that of British Honduras owned by Great Britain.

SOUTH AMERICA is a vast peninsula of a roughly triangular form about 5,000 mi. long by 3,230 mi. broad, having an area of about 7,000,000 sq. mi. The political divisions of S. A. are Brazil, Venezuela, Columbia, Equador, Peru, Bolivia, Chili, the Argentine Republic, Paraguay, Uruguay, and British, Dutch, and French Guiana.

Surface, Rivers, and Lakes.—There are four great systems of mountains in S. A., the greatest of which are the Andes, on the Pacific coast, stretching in a continuous chain for over four thousand miles. Next to the Himalayas this is the highest mountain range in the world, the highest point being 25,000 feet. The second system is that of the highlands of Guiana which lie north of the Amazon valley. Here are several irregular groups of mountains about 2,000 feet high which separate the plains of the Orinoco from those of the Rio Negro and the Amazon. The third system is the coast chain of Venezuela, the bighest point of which is 8.600 feet. The highest point of which is 8,600 feet. The Brazilian highland, the fourth system, is very broad, and crossed by low ranges of mountains. Its average height is less than half that of the Andes. From the configuration of its surface, the continent may be divided into five phys-ical regions: 1. The low country skirting the shores of the Pacific Ocean, from 50 to 150 mi. in breadth, and 4,000 in length. The two extremities of this territory are fer-tile, the middle a sandy desert. 2. The basin of the Orinoco, a country consisting of extensive plains, or steppes, called Llanos, either destitute of wood or merely dotted with trees, but covered with a very tall herbage during a part of the year. During the dry season the heat is intense here, and the parched soil opens into long fissures, in which lizards and serpents lie in a state of torpor. 3. The basin of the Amazon, a vast plain, embracing a surface of more than two million square miles, possessing a rich soil and humid climate. It is covered almost everywhere with dense forests, which harbor innumerable tribes of wild animals, and are thinly inhabited by savages,



who live by hunting and fishing. 4. The great southern plain, watered by the Plata and the numerous streams descending from the eastern summits of the Cordilleras. Open steppes, which are here called Pampas, occupy the greater portion of this region, which is dry, and in some parts barren, but in general is covered with a strong growth of weeds and tall grass, which feeds prodigious herds of horses and cattle, and affords shelter to a few wild animals. 5. The country of Brazil, eastward of the Paraná and Uruguay, presenting alternate ridges and valleys, thickly covered with wood on the side next the Atlantic, and opening into steppes, or pastures, in the interior.

The three important river systems of S. A. are the Amazon, the Orinoco, and the La Plata, the Amazon being the largest river on the globe. All of these rivers flow into the Atlantic. The Amazon rises in the Andes, and is 4,000 mi. long. It is navigable for The Orinoco rises in the about 2,300 mi. Parine mountains and is 1,400 mi. long. The Orinoco and the Amazon systems are connected by a small river called the Cassiqui-are. The Plata is formed by the confluence of the Panana and Uruguay rivers and is 185 mi. long, and at its mouth about 125 mi. wide. The principal smaller rivers are the San Francisco, the Rio Negro, the Colorado and Essequibo. The largest lake is Titicaca in the Andes, covering an area of about 4,000 sq. mi. and is over 12,000 feet above the level of the sea. There are several small lakes in the mountain regions but none of any special importance.

Geology. - The mountain areas of S. A. are as a general rule, those which have received the thickest accumulations of sedimentary During the periods of the formation matter. of such deposits, these areas were areas of subsistence, and since those beds which once formed the sea bottoms now constitute the highest peaks, these areas must have been subjected to subsequent upheaval. Vertical movements of this kind have occurred again and again, indicating that these areas are specially liable to disturbance. The history of the mountain chains is almost co-extensive with that of the continent itself. In the sea the beds were deposited horizontally, or nearly so; and at certain intervals the beds were uplifted above the sea. The rocks were at one time faulted, folded, and metamorphosed, and at other times denuded. The land was uplifted in a broad band, the axis of which ran parallel to the shore of the sea in which the beds were formed. The principal ridges formed during the same period usually coincide in direction with the stratigraphical strike of the bed forming them. The oldest rocks form the outermost rim of the continent, of which the n.e. and s.e. corners have prob-ably been swept away. These corners now correspond with the mouths of the Orinoco, the Amazon, and the La Plata rivers. Within this basin are schists and quartzites, which are in all probability of Silurian Age. Within

this again are sandstones and limestones, usually referred to the Carboniferous period, which also form part of the transverse ridges. A band of rocks of secondary age follow, some of which are believed to be Triassic, while Tertiary others are identified as Cretaceous. beds, some of Miocene date, together with Post-Tertiary beds, cover the largest part of the areas of the great river basins and the hollows in the mountain range, and also occur on the seaward flanks of the principal chains. There are some twenty or more volcanic cones, of which about a dozen are active. Bolivia has one or two active vents, and Peru several: but it is in Ecuador, with its dozen ignivomous vents, that have occurred the grandest and most frequent displays. Colombia has four or five volcanoes. With the exception of the Moluccas, no country in the world has had so many and so destructive earth-quake shocks as S. A. But these are concentrated along the Andes, and more particularly their western slope. Comparatively few are felt in the plains to the east of them. Peru seems to be the principal focus of action; and next to it in importance as a seismic area comes Chile. Bolivia is comparatively free from them, as also are Brazil and the Argentine Republic, but they are more frequent in Ecuador, Colombia, Venezuela, and the three Guianas.

The mineral wealth of S. A. consists in gold, silver, copper. mercury, diamonds, and other valuable metals. The desert coast of Chile is rich in guano, niter. valuable iodine compounds, and borax. Chile is also rich in copper and silver and the coal mines are being developed rapidly and give promise of great wealth. There are celebrated silver mines in Bolivia and considerable supplies of gold in Venezuela and Guiana. Some rich gold mines have been discovered in the southern part of Argentine. Brazil has some coal mines, but its great mineral wealth consists in diamonds.

Climate.-In the western and warmest part of the parched steppes of Caraccas, the hottest known region in America, the temperature of the air during the day is only 98° in the shade. At Calabozo, farther east in the Llanos, the common temperature of the day is only from 88° to 90°; and at sunrise the thermometer The basin of the Amazon is sinks to 80°. shaded with lofty woods; and a cool breeze from the east, a minor branch of the tradewind, ascends the channel of the stream, following all its windings, almost to the foot of the Andes. Hence this region, though under the equator, and visited with almost constant rains, is neither excessively hot nor unhealthy. Brazil, and the vast country extending westward from it between the Plata and the Amazon, is an uneven table-land, blessed with an equable climate. At Rio Janeiro, which stands low, and is exposed to a heat comparatively great, the temperature in summer varies from  $68^\circ$  to  $82^\circ$  F., and the mean is only about 74°. Farther north, and in the interior, the Indians find it necessary to keep fires in their huts; and in the country





#### America

near the sources of the Paraguay, hoar-frost is seen on the hills during the colder months, and the mean temperature of the year falls below 65° or 67°. On the declivities of the Andes, and on the high plains of Upper Peru, the heats are so moderate that the plants of Italy, France, and Germany come to maturity. Lower Peru, though a sandy desert, enjoys a wonderful degree of coolness, owing to the fogs which intercept the solar rays. At Lima, which is 540 feet above the sea, the tempera-ture varies from  $53^{\circ}$  to  $82^{\circ}$ , but the mean for the whole year is only  $72^{\circ}$ . At Buenos Ayres, for instance, the mean annual heat is 68° F. As we advance southward, the diminishing breadth of the continent makes the climate approximate to that of an island, and the extremes approach each other. In the Strait of Magellan the temperature of the warmest month does not exceed 43° or 46°; and snow falls almost daily in the middle of winter. The climate of Patagonia is absolutely colder than that of places in the same latitude in Europe; but the difference lies chiefly in the very low temperature of the summer. This peculiarity no doubt results chiefly from the greater coolness of the sea in the southern hemisphere; for beyond the parallel of 48°, the difference of temperature in the north and south Atlantic amounts, according to Humboldt, to 10° or 12° of Fahrenheit's scale. The sum of the peculiar qualities which distinguish the climate of South America may be briefly stated. Near the equator the new continent is humid; and within the tropics generally, owing to its vast forests, the absence of sandy deserts, and the elevation of the soil, it is cooler. Beyond the tropics the heat is nearly the same in the south temperate zone of America and the northern one of the old continent, till we ascend to the latitude of Cape Horn, where we have cold summers and a very limited range of the thermometer.

Vegetation .- The vegetable kingdom in S. A. has a magnificent development, particularly in the vast tropical territory east of the Andes, the basins of the Amazon, the Orinoco, and their tributaries, where the genera and species are very abundant, the forests large, and the forms gigantic. Besides its palms, it has dyewoods of all sorts, cedar, mahogany, ebony, etc.; farther south are the araucarias of Chile, and the beech forests of Argentine. There are numerous kinds of fruit trees, the fruit of which is usually very large, and covered with an extremely thick shell. Among these may be mentioned the cannon-ball tree and the Brazil-nut tree. Ferns and water lilies are also numerously represented, and splendid specimens of both are found. The jungle, or undergrowth, in the forests, is impenetrable in many places. Cinchona is found on the higher ground within the tropics. A holly is grown, the leaves of which are soaked in water, and produce a beverage called "Paraguay Tea.

Zoology.—The zoology of S. A. is extensive and peculiar, embracing a fourth of all the

known mammals, among which, however, are almost none of the wild animals so abundant in Africa and Asia. The most powerful of the carnivora is the jaguar, which is indeed the only formidable beast of prey in the whole continent. Of the other animals may be mentioned the great tapir, peccaries, sloths, anteaters, armadilloes; the llama, the chinchilla, and the monkey. The armadillo is said to be the only wild animal that increases with the increase of population. It catches mice and poisonous snakes, kills them, cuts them up, and eats as much as it requires. Although often hunted for its succulent flesh, by means of trained dogs, this singular animal actually multiplies in number as the population of the district it inhabits increases. If versatility in habits or adaptiveness can be taken as a measure of intelligence, the armadillo is the superior of the large-brained cats and canines. Many of the species are peculiar to S. A., and are not found elsewhere. Among birds the most notable are various parrots, humming-birds, flamingoes, toucans, and aracaris. Chief among the reptiles are alligators, boas, turtles, and rattlesnakes.

Population.-The aborigines of S. A. are undoubtedly of the same race as those of N. A., as there exists a very striking general physical resemblance between the native races throughout the whole of the American continent, from Cape Horn to Bering's Strait. See America and Indians. They are almost all of a copper color, with long black hair, deep-set black eyes, aquiline nose, and often hand-some, slender form. In S. A. these red men are far more numerous than in N. A., and though many are half-civilized, a greater number are in a state of barbarism. A considerable portion of the population also consists of persons of Spanish and Portuguese blood, and along with these a far greater number of mixed Indian and European blood, civilized, and forming an important element in the various states of the continent. To these are now being added considerable numbers of Spanish and Italian immigrants.

History.-Columbus first touched the continent at the mouth of the Orinoco in 1498. The next navigator to explore this continent was Hojeda, a Spaniard, who touched the continent near the equator and passed up the coast of Venezuela. He was accompanied by Amerigo Vespucci. Vespucci was an experienced mariner, and In 1500, after his return. published an account of the voyage, and on account of this the new world was called America. Spain and Portugal had almost entire control of the continent until the beginning of the nineteenth century. The Spanish colonies declared their independence in 1810 and after a ten years' war established a num-ber of republics. In 1823 Brazil became independent of Portugal and retained a monarchical form of government which lasted until 1889, when the form of government was changed to a republic. The only foreign possessions on the continent at the present time are those of British, French and Dutch Guiana.

# Americanism

Between the first of these and Venezuela there is a boundary dispute which has been submitted to arbitration. The U. S. Government having requested this under the authority of the Monroe Doctrine.'

Americanism, a term applied to certain words and idioms of the English language peculiar to the U.S. Following are a few of the more common Americanisms:-

Around or round, about or near. To hang around is to loiter about a place.

Backwoods, the partially cleared forest regions in the western states.

Bee, an assemblage of persons to unite their labors for the benefit of an individual or family, or to carry out a joint scheme.

Bogus, false, counterfeit.

Boss, an employer or superintendent of laborers, a leader.

Bug, a coleopterous insect, or what in England is called a beetle.

Buggy, a four-wheeled vehicle.

Bulldose, to; to intimidate voters.

Bunkum or buncombe, a speech made solely to please a constituency; talk for talking's sake, and in an inflated style.

Bureau, a chest of drawers; a dressing-table surmounted by a mirror.

Calculate, to suppose, to believe, to think.

Camp-meeting, a meeting held in the fields or woods for religious purposes, and where the assemblage encamp and remain several days.

Canebrake, a thicket of canes.

Caucus, a private meeting of the leading politicians of a party to agree upon the plans to be pursued in an approaching election.

Chunk, a short, thick piece of wood or any other material.

Cleter, good-natured, obliging. Cocktail, a stimulating drink made of brandy or gin mixed with sugar, and a very little water, etc.

Corn-husking, or corn-shucking, an occasion on which a farmer invites his neighbors to assist him in stripping the husks from his Indian corn.

Cowhide, a whip made of twisted strips of rawhide.

Creek, a small river or brook; not, as in England, a small arm of the sea.

Cunning, small and pretty, nice; as, it was such a cunning baby.

Dander, to get one's dander raised, to have one's dander up, is to have been worked into a passion.

Dead-heads, people who have free admission to entertainments, or who have the use of pub-

lic conveyances, or the like, free of charge.

Dépôt, a railway station.

Down east, in or into the New England states. A down-easter is a New Englander.

Drummer, a commercial traveler.

Dry goods, a general term for such articles as are sold by linen-drapers, haberdashers, hosiers. etc.

Fix, to; to put in order, to prepare, to adjust. To fix the hair, the table, the fire, is to dress the hair, lay the table, make up the fire.

Fixings, arrangements, dress, embellish-

# Americanism

ments, luggage, furniture, garnishings of any kind.

Gerrymander, to arrange political divisions so that in an election one party may obtain an advantage over its opponent, even though the latter may possess a majority of votes in the state; from the deviser of such a scheme, named Gerry, governor of Massachusetts.

Given name, a Christian name.

Grü, courage, spirit, mettle.

Guess, to; to believe, to suppose, to think, to fancy; also used emphatically, as you liquor up?" "I guess I will." 'Joe, will

Gulch, a deep, abrupt ravine, caused by the action of water.

Happen in, to; to happen to come in, or call. *Help*, a servant.

Highfulutin, inflated speech, bombast.

Hoe-cake, a cake of Indian meal baked on a hoe or before the fire.

Johnny-cake, a cake made of Indian corn meal mixed with milk or water, and sometimes a little stewed pumpkin; the term is also applied to a New Englander.

Julep, a drink composed of brandy or whisky with sugar, pounded ice, and some sprigs of mint.

Loafer, a lounger, a vagabond.

Log-rolling, the assembly of several parties of wood-cutters to help one of them in rolling their logs to the river after they are felled and trimmed; also employed in politics to signify a like system of mutual co-operation.

Lot, a piece or division of land, an allotment.

Lumber, timber sawed for use; as beams, joists, planks.

Lynch law, an irregular species of justice executed by the populace or a mob, without legal authority or trial.

Mail letters, to; to post letters.

Mitten: 10 get the mitten is to meet with a refusal.

Muss, a state of confusion.

Notions, a term applied to every variety of small wares.

One-horse: a one-horse thing is a thing of no value or importance, a mean and trifling thing.

Pickaninny, a negro child.

Pile, a quantity of money.

Planks, in a political sense, are the several principles which appertain to a party; platform is the collection of such principles.

*Reckon*, to; to suppose, to think.

Rile, to; to irritate, to drive into a passion. *Rooster*, the common domestic cock.

Scalawag, a scamp, a scapegrace.

Shanty, a structure such as squatters erect; a temporary hut.

Skedaddle, to; to run away; a word introduced during the CivilWar.

Smart, often used in the sense of considerable, a good deal, as a smart chance.

Span of horses, two horses as nearly as possible alike, harnessed side by side.

Spread-eagle style, a compound of exaggeration, bombast, mixed metaphor, etc.

Spry, active.

Stampede, the sudden flight of a crowd or number.

#### Americus

Store, a shop, as a book store, a grocery store. Strike oil, to; to come upon petroleum; hence to make a lucky hit, especially financially.

Stump speech, a bombastic speech calculated to please the popular ear, such speeches in newly-settled districts being often delivered from stumps of trees.

Tall, great, fine (used by Shakespeare pretty much in the same sense); tall talk is extravagant talk.

*Ticket*: to vote the *straight ticket* is to vote for all the men or measures your party wishes.

Truck, the small produce of gardens; truck patch, a plot in which the smaller fruits and vegetables are raised,

Ugly, ill-tempered, vicious.

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Vamose, to; to run off (from the Spanish ramos, let us go).

Will, to; to fade, to decay, to droop, to wither.

Americus, Sumter co., Ga.; has a female college, a large carriage factory, etc. Pop. 6,398.

Amerigo Vespucci (à-mer-è go vesput'chē) (1451-1512), a maritime discoverer, after whom America has been named. In 1499 he coasted along the continent of America for several hundred leagues, and the publication of his narrative, while the prior discovery of Columbus was yet comparatively a secret, led to the giving of his name to the new continent.

Amersfoort (ä'merz-fört), a town in Holland, province of Utrecht, manufactures woolen goods, tobacco, glass, and silk yarn. Pop. 14,863.

Ames, FISHER (1758–1808), a distinguished American statesman of the Revolutionary era, an orator of great power, famous for his eulogy on Washington.

Ames, OAKES (1804-1873), born in Easton, Mass. Congressman from 1862-1873 from the second Massachusetts district. He was interested in contracts for building the Union Pacific railroad, and his connection with the Credit Mobilier led to a congressional investigation and Mr. Ames was censured. He withdrew from political life. His son, Oliver, became governor of Massachusetts, 1880.

Amesbury, Essex co., Mass., on Merrimac River, 5 mi. n. of Newburyport. Railroads: Boston & Maine; Haverhill & Amesbury; Newburyport & Amesbury. Industries: woolen company, 45 carriage factories. shoe, hat, and bicycle factories. Surrounding country agricultural. Birthplace of Josiah Bartlett, signer of Declaration of Independence, and burial place of John G. Whittier. First frigate Alliance for Continental Congress built here. The town was first settled in 1630. Pop. est. 1897, 10,000.

Amherst, Hampshire co., Mass., 25 mi. s. of Springfield. Railroads, Boston & Maine, and Central Vermont. Industries, two large straw-hat factories. Surrounding country agricultural. Amherst College is located here, also Massachusetts Agricultural College. Amherst was first settled in 1731 by people from

#### Ammoniaphone

Hadley, and it is still a town Pop. est. 1897, 5,000.

Amherst (am'erst), a seaport of British Burmah, 31 mi. s. of Moulmein, a health resort of Europeans. Pop. 3,000. The district of Amherst has an area of 15,189 sq. mi. Pop. 301,086. It exports rice and teak.

Amherst, JEFFREY, Lord (1717-1796), a British general, who fought at Dettingen and Fontenoy, and commanded in America, where he took Louisburg. Ticonderoga, and Quebec, and restored the British prestige in Canada. He was raised to the peerage, became commander-in-chief, and ultimately field-marshal.

Amiens (à.m.e.an), a town of France, capital of the department of Somme. It has a citadel, wide and regular streets, and several large open areas; a cathedral, one of the largest and finest Gothic buildings in Europe, founded in 1220. It has a large trade and numerous important manufactures, especially cottons and woolens. It was taken by the Germans in 1870. Pop. 80,288. The Peace of Amiens, concluded between Great Britain, France, Spain, and the Batavian Republic, March 27, 1802, put au end for a time to the great war which had lasted since 1793.

Ammana'ti, BARTOLOMEO (1511-1589), an Italian sculptor and architect; executed the Leda at Florence, a gigantic Neptune for St. Mark's Place at Venice, a colossal Hercules at Padua, and built the celebrated Trinity Bridge at Florence.

Am'mon, an ancient Egyptian deity, identlfied by the Greeks with Zeus; represented as a human being with a ram's head, or simply with the horns of a ram. There was a celebrated temple of Ammon in the Oasis of Siwah in the Libyan desert.

Ammo'nia, an alkaline substance, which differs from the other alkalies by being gaseous, and is hence sometimes called the volatile alkali. It is a colorless, pungent gas, composed of nitrogen and hydrogen. It was first procured in that state by Priestley, who termed it alkaline air. He obtained it from sal-ammoniac by the action of lime, by which method it is yet generally prepared. It is used for many purposes, both in medicine and scientific chemistry; not, however, in the gaseous state, but frequently in solution in water, under the names of liquid ammonia, aqueous ammonia, or spirits of hartshorn. It may be procured naturally from putrescent animal substances; artificially it is chiefly got from the distillation of coal and of refuse animal substances, such as bones, clippings and shavings of horn, hoof, etc. It may also be obtained from vegetable matter when nitrogen is one of its elements. Sal-ammoniac is the chloride of ammonium.

Ammo' niaphone, an instrument. consisting of a metallic tube containing some substance saturated with ammonia, peroxide of hydrogen, and a few flavoring compounds. fitted with a mouthpiece to breathe through, which is said to render the voice strong, clear, rich, and ringing by the inhalation of the ammoniacal vapor. It was invented by Dr. Carter Moffat, and was suggested by the presence of

#### Ammonite

ammonia in some quantity in the atmosphere of Italy— the country of fine singers.

Am monite, a fossil Cephalopod, allied to the Nautilus, having a many-chambered shell, in shape like the curved horns on the ancient statues of Jupiter Ammon; characteristic of



Ammonites.

the Trias, Lias, and Oolite formations, and sometimes found in immense numbers and of great size.

Am'monites, a Semitic race frequently mentioned in Scripture, descended from Ben-Ammi, the son of Lot (Gen. 19:38), often spoken of in conjunction with the Moabites. A predatory and Bedouin race, they inhabited the desert country east of Gad, their chief city being Rabbath-Ammon (Philadelphia). Wars between the Israelites and the Ammonites were frequent; they were overcome by Jephthah, Saul, David, Uzziah, Jotham, etc. They appear to have existed as a distinct people in the time of Justin Martyr, but have subsequently become merged in the aggregate of nameless Arab tribes.

Ammo'nium, the name given to the hypothetical base of ammonia, analogous to a metal, as potassium. It has not been isolated, but it is believed to exist in an amalgam with mercury.

Ammuni'tion, military stores generally; in modern usage confined to the articles used in the discharge of firearms and ordnance of all kinds, as powder, balls, shells, various kinds of shot, etc. Which see.

Am' nesty, the releasing of a number of persons who have been guilty of political offenses from the consequence of these offenses.

Amol', a town of northern Persia. 76 mi. n.e. of Teheran. Extensive ruins tell of former greatness, the most prominent being the mausoleum of Seyed Quam-u-deen, who died in 1378. Population in winter estimated at about 40,000.

Amo'mum, a genus of plants of the ginger species, natives of warm climates, and remarkable for the pungency and aromatic properties of their seeds. Some of species yield cardamoms, others grains of paradise.

Amoo-Darlä, a Russian territory of Central Asia, on the east of the Amoo, and southeast of the Sea of Aral. Area 40,000 sq. mi; pop. 220,000.

Amoor' (or Amur'), one of the largest rivers of Eastern Asia, course 1,500 miles. It forms, for a large portion of its course, part of the boundary line between the Russian and the Chinese dominions, and is navigable through-

# Amphibia

out for four months in the year.—AMOOR TER-RITORY. In 1858 Russia acquired from China the territory on the left bank of the Upper and Middle Amoor, together with that on both banks of the Lower Amoor. The western portion of the territory was organized as a sep-

arate province, with the name of Amoor (area 173,559 sq. mi.; pop. 58,000). The eastern portion was joined to the Maritime Province of eastern Siberia.

A'mor, the god of love among the Romans, equivalent to the Greek Eros.

Am'orites, a powerful Canaanitish tribe at the time of the occupation of the country by the Israelites; occupied the whole of Gilead and Bashan, and formed two powerful

kingdoms—a northern, under Og, who is called king of Bashan; and a southern under Sihon, called king of the Amorites; first attacked and overthrown by Joshua; subsequently subdued, and made tributary or driven to mingle with the Philistines and other remnants of the Canaanitish nations.

A'mos, one of the minor prophets; flourished under the kings Uzziah of Judah and Jeroboam II of Israel (B. c. 810 to 784 by the common chronology). His book of prophecies has high literary merits. It contains denunciations of Israel and the surrounding nations, promises of the Messiah.

Amoy', an important Chinese trading port, on a small island off the s.e. coast opposite Formosa; has a safe and commodious harbor, and its merchants are among the wealthiest and most enterprising in China; one of the five ports opened to British commerce in 1843, now open to all countries. Pop. 95,600.

Ampère (an-par). ANDRE-MARIE (1775-1836), a celebrated French mathematician and philosopher, founder of the science of electrodynamics, professor of mathematical analysis at the Polytechnic School, Paris, and of physics at the College of France. What is known as *Ampere's Theory* is that magnetism consists in the existence of electric currents circulating round the particles of magnetic bodies, being in different directions round different particles when the bodies are unmagnetized, but all in the same direction when they are magnetized.

Amphib'ia, a class of vertebrate animals, which in their early life breathe by gills or branchiæ, and afterward partly or entirely by lungs. The Frog, breathing in its tadpole state by gills and afterward throwing off these organs and breathing entirely by lungs in its adult state, is an example of the latter phase of amphibian existence. The Proteus of the underground caves of Central Europe exemplifies forms in which the gills of early life are retained throughout life, and in which lungs are developed in addition to the gills. A second character of this group consists in the presence of two occipital "condyles," or processes by means of which the skull articulates with the spine or vertebral column, reptiles possessing one condyle only. The class is divided into four orders: the Ophiomorpha (or serpentiform), represented by the Blindworms, in which limbs are wanting and the body is snake-like; the Urodela or "Tailed" Amphibians, including the Newts, Proteus, Siren, etc.; the Anoura, or tailless Amphibia, represented by the Frogs and Toads; and the Labyrinthodontia, which includes the extinct forms known as Labyrinthodons.

Amphic'tyonic League (or council), in ancient Greece, a confederation of tribes for the protection of religious worship, but which also discussed questions of international law, and matters affecting their political union. The most important was that of the twelve northern tribes which met alternately at Delphi and Thermopylæ. The tribes sent two deputies each, who assembled with great solemnity; composed the public dissensions, and the quarrels of individual cities, by force or persuasion; punished civil and criminal offenses, and particularly transgressions of the law of nations, and violations of the temple of Delphi. Its calling on the states to punish the Phocians for plundering Delphi caused the Sacred Wars, 595-586, 448-447, 357-346 B. C.

Amphi'on, in Greek mythology, son of Zeus and Antiöpë, and husband of Niöbë; had miraculous skill in music, being taught by Mercury, or, according to others, by Apollo. In poetic legend he is said to have availed himself of his skill when building the walls of Thebes—the stones moving and arranging themselves in proper position at the sound of his lyre.

Amphithe'ater, an ancient Roman edifice of an oval form without a roof, having a central area (the *arena*) encompassed with rows of seats, rising higher as they receded



Amphitheater.

from the center, on which people used to sit to view the combats of gladiators and of wild beasts, and other sports. The Colosseum at Rome is the largest of all the ancient amphitheaters, being capable of containing from 50,000 to 80,000 persons. That at Verona is one of the best examples remaining. Its dimensions are 502 feet by 401, and 98 feet high. The name means "both-ways theater," or "theater all round," the theater forming only a semicircular edifice.

#### Amsterdam

Amphitri'te, in Greek mythology, daughter of Oceanus and Tethys, or of Nereus and Doris, and wife of Poseidon (or Neptune), represented as drawn in a chariot of shells by Tritons, with a trident in her hand.

Amphit'ryon, in Greek legend, king of Thebes, son of Alcæus, and husband of Alcmena. Plautus, and after him Molière, have made an amour of Zeus with Alcmena the subject of amusing comedies.

Ampudia, PEDRO DE, Mexican, was appointed general by Santa Anna in 1840; in 1842, he commanded the land forces in the siege of Campeachy, Yucatan. Later he was in command of Monterey, where, in 1846, he surrendered to General Taylor of the U. S.

Amputa'tion, in surgery, that operation by which a member is separated from the body according to the rules of the science. See Surgery.

Amra'oti, a town of British India in Berár; it is celebrated for its cotton, and is a place of good trade. Pop. 23,550. The district has an area of 2,767 sq. mi.; pop. 546,448.

Am'ritsir (or Amritsar) ("the pool of immortality"), a flourishing commercial town of Hindustan, capital of a district of the same name, in the Punjab, the principal place of the religious worship of the Sikhs. It has considerable manufactures of shawls and silks; and receives its name from the sacred pond constructed by Ram Das, the apostle of the Sikhs, in which the Sikhs and other Hindus immerse themselves that they may be purified from all sin. Pop. 151,896. The district of Amritsir has an area of 1,574 sq. mi. Pop. 893,266.

Am'ru, originally an opponent, and subsequently a zealous supporter of Mohammed, and one of the ablest of the Mohammedan warriors. He brought Egypt under the power of the Caliph Omar in 638, and governed it wisely till his death in 636. The burning of the famous Alexandrian Library has been generally attributed to him, though only on the authority of a writer who lived six centuries later.

Am'sterdam (that is, "the dam of the Amstel"), one of the chief commercial cities of Europe, capital of Holland. On account of the lowness of the site of the city the greater part of it is built on piles. It is divided by numerous canals into about 90 islands, which are connected by nearly 300 bridges. Among its numerous industries may be mentioned as a speciality the cutting and polishing of dia-monds. The harbor, formed by the Y river, lies along the whole of the north side of the city, and is surrounded by various docks and basins. The trade is very great, being much facilitated by the great ship-canal (15 mi. long, 22-26 feet deep, constructed 1865-76), which connects the Y directly with the North Sea. Another canal, the North Holland Canal (46 mi. long, 20 feet deep), connects Amsterdam with the Helder. During the seventeenth and eighteenth centuries Amsterdam was one of the wealthiest and most flourishing cities in the world. Its forced alliance with France

#### Amsterdam

ruined its trade, but since 1813 its commerce has revived. Pop. 417,539.

Amsterdam, Montgomery co., N. Y., on Mohawk River, 33 mi. w. of Albany. Railroads: N. Y. C. & H. R., and West Shore. Industries: carpet mills, linseed oil, broom, carriage springs, and knitted goods factories. Surrounding country agricultural. The town was first settled about 1776 and became a city in 1885. Pop. est. 1897, 20,000.

**Amuck** (Amuk), to run, a phrase applied to natives of the eastern Archipelago who are occasionally seen to rush out in a frantic state, making indiscriminate and murderous assaults on all that come in their way. The cause of such outbursts is not well known.

Amyl' ic Alcohol, another name for fusel oil.

Amyrida cese, a natural order of plants consisting of tropical trees or shrubs, the leaves, bark, and fruit of which abound in fragrant, resinous, and balsamic juices. Myrrh, frankincense, and the gum-elemi of commerce are among their products.

Anabap' tists, a name given to a Christian sect by their adversaries, because, as they objected to infant baptism, they rebaptized those who joined their body. The founder of the sect appears to have been Nicolas Storch, a disciple of Luther. He incited the peasantry of Suabia and Franconia to insurrection. This insurrection was quelled in 1525. In 1534 the town of Münster in Westphalia became their center of action. Bockhold became leader. assuming the name of John of Leyden, king of the New Jerusalem, and Münster became a theater of all the excesses of fanati-cism, lust, and cruelty. They rejected the practise of polygamy, community of goods, and intolerance toward those of different opinions which had prevailed in Münster. The application of the term Anabaptist to the general body of Baptists throughout the world is unwarranted. The Baptists repudiate the name Anabaptist.

Anab'asis ("a going up"), the Greek title of Xenophon's celebrated account of the expedition of Cyrus the Younger against his brother Artaxerxes, king of Persia. The title is also given to Arrian's work which records the campaigns of Alexander the Great.

Anach' ronism, an error of chronology by which things are represented as co-existing which did not co-exist; applied also to anything foreign to, or out of keeping with, a specified time. The anachronisms of authors and painters have furnished materials for many amusing magazine articles. In art, some of the most glaring instances have occurred in the works of the Dutch school, as for instance arming scriptural characters with guns or attiring them in the costume of the seventeenth century.

Anacon'da, the popular name of two of the largest species of the serpent tribe; viz., a Ceylonese species of the genus Python, said to have been met with, 33 feet long; and a native of tropical America, allied to the boa-constrictor, and the largest of the serpent tribe,

#### Anakim

attaining the length of 40 feet. See Boa-constrictor.

Anaconda, Deer Lodge co., Mon., the center of an active mining district. Population about 5,000.

Anac'reon, an amatory lyric Greek poet of the sixth century B. C., native of Teos, in Ionia. Only a few fragments of his works have come down to us; the collection of odes that usually passes under the name of Anacreon is mostly the production of a later time.

Anæsthet'ics, medical agents employed for the removal of pain, especially in surgical operations, by suspending sensibility either locally or generally. Various agents have been employed for both of these purposes, from the earliest times, but the scientific use of anæsthetics may be said to date from 1800, when Sir Humphrey Davy made experiments on the anæsthetic properties of nitrous oxide, and recommended its use in surgery. In 1818 Faraday established the anæsthetic properties of sulphuric ether, but this agent made no advance beyond the region of experiment, till 1844, when Dr. Wells, a dentist of Hartford, Conn., applied the inhalation of sulphuric ether in the extraction of teeth, but owing to some misadventure did not persevere with it. The example was followed in 1846 by Dr. Morton, a Boston dentist, who also extended the use of ether to other surgical operations. The practise was soon after introduced into England by Mr. Liston, and a London dentist, Mr. Robinson. A few weeks later Sir James Simpson made the first application of ether in a case of midwifery. This was early in 1847. Toward the end of the same year Simpson had his attention called to the anæsthetic efficacy of chloroform, and announced it as a superior agent to ether. This agent has since been the most extensively used anæsthetic, though the use of ether still largely prevails in the U.S. In their general effects ether and chloroform are very similar: but the latter tends to enfeeble the action of the heart more readily than the former. For this reason great caution has to be used in administering chloroform where there is weak heart action from disease. Local anæsthesia is produced by isolating the part of the body to be operated upon, and producing insensibility of the nerves in that locality. Dr. Richardson's method is to apply the spray of ether, which, by its rapid evaporation, chills and freezes the tissues and produces complete anæsthesia. This mode of treatment, besides its use in minor surgical operations, has recently begun to have important remedial applications. A valuable local anæsthetic now employed is cocaine. See Coca.

Anahuac (à-nà-wàk') ("near the water"), an old Mexican name applied to the plateau of the city of Mexico, from the lakes situated there, generally elevated from 6,000 to 9,000 feet above the sea.

An'akim, the posterity of Anak, the son of Arba, noted in sacred history for their flerceness and loftiness of stature. Their stronghold was Kirjath-arba, or Hebron, which was taken and destroyed by Caleb and the tribe of Judah.

Anal'ysis, the resolution of an object, whether of the senses or the intellect, into its component elements. In philosophy it is the mode of resolving a compound idea into its simple parts, in order to consider them more distinctly, and arrive at a more precise knowledge of the whole. It is opposed to synthesis, by which we combine and class our perceptions, and contrive expressions for our thoughts, so as to represent their several divisions, classes, and relations.

Analysis, in mathematics, is, in the widest sense, the expression and development of the functions of quantities by calculation; in a narrower sense the resolving of problems by algebraic equations. The analysis of the ancients was exhibited only in geometry, and made use only of geometrical assistance, whereby it is distinguished from the analysis of the moderns, which extends to all measurable objects, and expresses in equations the mutual dependence of magnitudes. Analysis is divided into lower and higher; the lower comprising, besides arithmetic and algebra, the doctrines of functions, of series, combinations, logarithms, and curves: the higher comprising the differential and integral calculus, and the calculus of variations.

In chemistry, analysis is the process of decomposing a compound substance with a view to determine either (a) what elements it contains (qualitative analysis), or (b) how much of each element is present (quantitative analysis). Thus by the first process we learn that water is a compound of hydrogen and oxygen, and by the second that it consists of one part of hydrogen by weight to eight parts of oxygen.

Anam', a country of Asia occupying the e. side of the Indo-Chinese Peninsula. It is composed of three parts: Tonquin in the n.; Co-chin-China in the s.; and the territory of the Lass tribes, s.w. of Tonquin. Area together, 170,000 sq. mi.; pop. 15,000,000 -9,000,000 in Tonquin. Tonquin is mountainous on the north, but in the east is nearly level, terminating toward the sea in an alluvial plain yielding good crops of rice, cotton, fruits, ginger, and spices, and a great variety of varnish-trees, palms, etc. The principal river is the Song-ka, which has numerous tributaries, many of them being joined together by canals, both for irrigation and commerce. Tonquin is rich in gold, silver, copper, and iron. Cochin-China is, generally speaking, unproduc-tive, but contains many fertile spots, in which grain, leguminous plants, sugar-cane, cinnamon, etc., are produced in great abundance. Agriculture is the chief occupation, but many of the inhabitants are engaged in the spinning and weaving of cotton and silk into coarse fabrics, the preparation of varnish, iron-smelting, and the construction of ships or junks. The inhabitants are said to be the ugliest of the Mongoloid races of the peninsula, being under the middle size and less robust than the surrounding peoples. Their language is monosyl-

#### **Anastatic Printing**

labic, and is connected with the Chinese. The religion of the majority is Buddhism, but the educated classes hold the doctrines of Con-The principal towns are Hanoi, the fucius. capital of Tonquin, and Huë, the capital of Cochin-China, and formerly of the whole empire. Anam was conquered by the Chinese in 214 B. C., but in 1428 A. D. it completely won its independence. The French began to interfere actively in its affairs in 1847 on the plea of protecting the native Christians. By the treaties of 1862 and 1867 they obtained the southern and most productive part of Cochin-China, subsequently known as French Cochin-China and in 1874 they obtained large powers over Tonquin, notwithstanding the protests of the Chi-nese. Finally in 1883 Tonquin was ceded to France, and next year Anam was declared a French protectorate. After a short period of hostilities with China the latter recognized the French claims, and Tonquin is now directly administered by France, while Anam is entirely under French direction.

Anani'as, a disciple at Jerusalem, who, having with his wife Sapphira, committed a fraud, was with her struck dead.

Anarajapoo'ra (or Anuradhapura), a ruined city, the ancient capital of Ceylon, built about 540 B. C., and said to have covered an area of 300 sq. mi., doubtless a great exaggeration. The great object of interest is the sacred Bo-tree planted over 2,000 years, and probably the oldest historical tree in the world, but shattered by a storm in 1887.

An'archists, a revolutionary sect or body setting forth as the social ideal the extreme form of individual freedom, and holding that all government is injurious and immoral, that the destruction of every social form now existing must be the first step to the creation of a new world. Their recognition as an independent sect may be dated from the secession of Bakunin and his followers from the Social Democrats at the congress of The Hague in 1872, since which they have maintained an active propaganda. Their principal journals have been La Révolle (Paris), the Freiheit (New York), Liberty (Boston), and the Anarchist (London). Akin to the Nihilists, of alien birth, the Anarchists in America, with the exception of a bomb outrage in Chicago, have accomplished little.

Anasta'slus I (491-518 A. D.), Emperor of the East, succeeded Zeno, at the age of sixty. He was a member of the imperial lifeguard, and owed his elevation to Ariadne, widow of Zeno, whom he married. He distinguished himself by suppressing the combats between men and wild beasts in the arena, abolishing the sale of offices, building the fortifications of Constantinople, etc.

Anastat'ic Printing, a mode of obtaining fac-simile impressions of any printed page or engraving by transferring it to a plate of zinc, which, on being subjected to the action of an acid, is etched or eaten away with the exception of the parts covered with the ink, which parts, being thus protected from the action of

the acid, are left in relief so that they can readily be printed from.

Anatomy is that branch of biological science, which treats of the structure of organized The words anatomy and dissection bodies. are synonymous etymologically; but custom, while retaining the original meaning of the latter word (literally, to cut apart) has broadened that of the former until it has come to include all the many sciences embraced within the one great science of organic form. Thus we speak of Human, Animal, and Vegetable Anatomy; of Embryology, or develop-mental anatomy; of Comparative Anatomy, which teaches the variations of corresponding structures in different animals; of Philosoph-ical Anatomy, which teaches Homology, or the fundamental identity of organs arising from the same parts of the embryos of different species; of Histology, or the study of the minute anatomy of the tissues; of Descriptive Anatomy, treating of the gross form and rela-tions of organs and structure; and finally of Systematic and Topographical (regional or surgical) Anatomy; the former treating of systems; e. g., digestive, genito-urinary, nervous, vascular, muscular systems; the latter treat-ing of regions made up of parts of several systems; e. g., neck, abdomen, arm, leg. We will consider here only Human Anatomy, and under this head only Systematic Anatomy. For other branches of the subject, see Histology and Embryology.

SYSTEMATIC ANATOMY.- In response to the tendency to specialization observed in many celled organisms, the cells of the human body group themselves into systems, each performing certain functions, although the law of the physiological division of labor imposes the closest interdependence between each system and its yoke-fellows. In every system we find one or more most highly specialized cell-groups to which we give the name of organs. Entering intimately into the composition of organs, as well as binding them together and keeping them in proper correlation with other organs, we find tissues. These latter are the ultimate results of cell-differentiation, and are considered under Histology. We recognize the following principal systems sufficiently isolated by function to require separate consideration: 1, Skeleton, Osseous System, the supporting framework of the body: 2, Articular System the system of joints: 3, Muscular System, a series of elastic and voluntarily contractile fibers, the ends of which are inserted into the extremities of the bones: 4, Vascular System, a series of tubes which supply the tissues with nourishment and carry away the effete pro-ducts of the body; 5, Respiratory System, through which oxygen enters the blood, and carbon-dioxide is thrown off; 6, Digestive System, through which soluble food is elaborated from insoluble diet; 7, Urinary System, effete products taken up by the blood are eliminated in part through this system; 8, Reproductive Organs; 9, Nervous System. All of these various systems are united anatomically by masses of connective tissue.

Osseous System, or Skeleton. Articular System, or Joints.— The skeleton is composed of 200 bones, of which 74 belong to the Azial skeleton (head, neck, and trunk), and 126 to the extremities, or Appendicular skeleton. This number does not include certain small bones developed in tendons as they pass across bony angles.

Axial Skeleton.-The vertebral column, or spine, is made up of 26 bones, of which 7, called cervical vertebræ, are located in the neck; 12, called dorsal or thoracic vertebræ, lie in the thoracic region, or chest, and sup-port 24 ribs and the sternum; 5 lie in the foin or lumbar region and are called lumbar vertebræ; the sacrum (made up during early life of five sacral vertebræ which fuse into one solid mass in the adult), in the sacral or pelvic region, forming a kind of keystone, by which the weight of the body is transmitted to the pelvic girdle and the lower extremities; and the coccyx (made up dur-ing early life of 4 rudimentary vertebræ), in the coccygeal region. Each vertebræ is composed of a body, or centrum, from which arise two arches, a neural arch, enclosing a segment of the spinal cord or marrow, lying in the neural or spinal canal, and a hæmal, or visceral arch enclosing more or less completely a segment of the great visceral cavity found in the neck, chest, and abdomen. The neural canal is complete except in the lower sacral and coccygeal regions. The visceral arches, however, are subject to many vicissitudes, and it is only in the upper thoracic region that we find them completely encircling the visceral cavity, each arch being completed by two ribs and a segment of the sternum or breast-bone. In the lower thoracic region the ribs do not completely encircle the cavity. Strength, combined with great elasticity and flexibility, is provided for the spinal column by anterior, posterior, and lateral ligaments, by pads of cartilage placed between the vertabræ, and by an alternation of anterior and posterior curves in the four principal regions. The ribs are tipped anteriorly with costal cartilages and the seven upper (true) ribs are joined to the sternum by their cartilages. Of the remaining five ribs (false), the upper three are fixed to the cartilages above, but not to the sternum, and the lower two are free or floating. In the sternum we recognize three pieces, united in the adult - manubrium or handle, gladiolus or body, and xiphoid or ensiform appendix.

The axial skeleton is completed by the skull and hyoid bone—23 bones, of which 8 (occipital, sphenoid, ethmoid, frontal, 2 parietals, 2 temporals) enter into the cranium or brain case, and 15 (vomer, 2 nasals, 2 lachrymals, 2 palates, 2 malar, 2 superior maxillaries, 2 maxillo or inferior turbineals, inferior maxillary, hyoid) form the bony framework of a series of arches (face and neck) surrounding the organs of special sense and the upper orifices of the respiratory and digestive organs. See *Embryology*. Springing upward from the axis is a series of arches composed of thin, flat bones enveloping the brain, and either

paired, or developed from paired ossific de-These arches bear a close resemblance posits. to the neural arches of the vertebrae, especially when we consider that the brain is merely the expanded end of the spinal cord. Thrown downward from the cranio-facial axis are other arches: (a) enclosing the nose and forming the roof of the mouth; (b) the lower jaw and the floor of the mouth. Certain bones are also formed in connection with the organs of special sense, these organs being pushed in above or between the arches: (a) malar and lachrymal bones in relation to the organ of vision, and above the palato-maxillary arch; (b) turbinal bones for the reception of the organ of smell, between the two maxillaries; (c) petrous and mastoid parts of the temporal bones, containing the organ of hearing, and lying between the occipital and sphenoid bones; (d) the organ of taste, supported below and behind by the hyoid bone, and pushed in between the maxillary and mandibular arches; (e) the organ of voice (larynx) suspended from the hyoid bone and surmounted by one or more very rudimentary cartilaginous arches. The cavity containing the eye-ball and its machinery is called the orbit; the passage leading from without into the petrous and mastoid part of the temporal bone is called the external auditory meatus; the parallel nasal passages leading from the nostrils to the throat are called *nares.* Opening into the nares are chambers or sinuses in the frontal, ethmoid, sphenoid, and maxillary bones, containing air and modifying the voice as by a sounding-A bony bar running from the outer board. margin of the orbit to just above the external auditory meatus is called the Zygoma. and partly encloses the great temporal and Zygomatic fossæ for the reception of the muscles of mastication. The upper and lower jaw are provided with alveolar processes containing sockets for the reception of teeth, of which there are 32 in the adult jaws (8 incisors, 4 canines, 8 biscuspids, 12 molars), and 20 (milk or temporary) teeth in the jaws of the infant. The mandible, or inferior maxillary, joins the skull by means of an articular condyle, fitting into the glenoid fossa of the temporal bone, and is the only movable bone of the skull, the others being immovably united by sutures. Separating the mouth from the nose is the hard palate, made up of horizontal plates from the maxillary and palate bones. The cranial cavity is smooth and unbroken above, but broken into fossæ below for the reception of the cerebrum and cerebellum. The spinal cord leaves the cranial cavity through the foramen magnum (foramen: a hole or opening) in the occiptal bone, on either side of which can be seen the occipital condyles for articulation with the atlas. Other openings give passage to nerves and vessels to and from the brain: through the optic foramen pass the optic nerve and ophthalmic artery; through the sphenoidal fissure between the wings of the sphenoid pass the nerves to the orbit; through the carotid foramen passes the artery of that name; through the jugular forumen pass the jugular vein and the ninth, tenth, and eleventh nerves; through the round and oval openings pass branches of the fifth nerve; through the internal auditory meatus pass the facial and auditory nerves; through the *anterior condylar foramen* passes the twelfth nerve. The hyoid bone lies between the tongue and the larynx and is joined to the skull (styloid process of temporal bone) by a stylo-hyoid ligament. The hyoidean arch is the last of the visceral arches of the human skull.

Appendicular Skeleton.—This skeleton com-prises the shoulder girdle with the upper extremities (64 bones), and the pelvic girdle with the lower extremities (62 bones). The shoulder girdle is made up of clavicle or collar-bone, and scapula or shoulder-blade, bound together at the outer extremities by ligaments, and joined to the trunk at one point only by a small gliding joint between the inner extremity of the clavicle and the upper piece of the sternum. By thus pivoting the upper ex-tremity on the trunk, there is secured great freedom of motion with little loss of power by joint friction. The clavicle is a slender bone shaped like the Roman S, lying between sternum and scapula. The scapula is a flat, irregularly triangular bone lying close to the side of the thorax, but separated and sus-The part applied pended from it by muscles. to the thorax is the sub-scapular fossa; the part looking backward and outward is divided into supra-and infra-spinous fossæ by a prominent spine, which projects upward and outward. At the outer angle of the scapula, between coracoid, clavicle, and acromion, is the glenoid fossa for the reception of the humeral head (ball and socket joint). The glenoid and humerus are held together in the shoulder joint by the action of the shoulder muscles, and by a loose sac called the capsular ligament, permitting a wide range of motion in almost every direction. The humerus, or arm bone, is a long bone, at the upper extremity of which are found a head, neck, and two tuberosities; below these is a long, rounded shaft, grooved behind by the musculo-spiral nerve, and supporting an irregularly flattened inferior extremity, presenting a trochlea (pulley surface) and capitellum (head) for articulation with the ulna and radius respectively. In the forearm (or antibrachium) are found the radius externally and the ulna internally. These bones are united to the humerus by a hinge-joint, permitting only antero-posterior motion, the head of the radius playing on the capitellum, and the ulna presenting a great sigmoid notch for the reception of the trochiea (or pulley) of the humerus. At their inferior extremities the forearm bones join the carpus, the radius directly, the ulna indirectly through the inter-vention of a small fibro-cartilage. The ulna is heaviest at the humeral end, the radius at the carpal end. The carpus or wrist (8 bones) is irregularly biconvex and made up of two rows of small bones united by ligaments and lying between forearm and palm. The metacarpus (paim) is made up of five metacarpal bones numbered from thumb to little



# FRONT VIEW OF SKELETON.

- I. Frontal Bone.
- 2. Parietal Bone.
- 3. Coronal Suture.
- Squamous portion of Temporal Bone.
- 5. Mastoid Process of Temporal Bone.
- 6. Zygoma.
- 7. Superior Maxillary Bone.
- 8. Inferior Maxillary Bone.
- 9. Tempero-Maxillary Articulation.
- 10. Nasal Bone.
- 11. Orbit.
- 12, Cervical Vertebra.
- 13. First Rib.
- 14. Clavicle.
- 15. Manubrium,
- 16. Body of Sternum.
- 17. Ensiform Process of Sternum.
- 18. Shoulder Blade (Scapula).
- 19. Acromion Process of Scapula.
- 20. Costal Cartilage.
- 21. Seventh Rib.
- 22. Eighth (First False) Rib.
- 23. Twelfth (Fifth False) Rib.
- 24. Twelfth Dorsal Vertebra.
- 25. Lumbar Vertebra.
- 26. Head of Humerus,
- 27. Humerus.
- 28, Elbow-Joint.
- 29. Radius.
- 30. Ulna.
- 31. Wrist.
- 32. Metacarpal Bone.
- 33. Thumb.
- 34. Phalanges of Fingers.
- 35. Sacrum.
- 36. Ilium.
- 37. Crest of the Ilium.
- 38. Pubic Bone.
- 39. Ischium.
- 40. Sacro-Iliac Symphysis,
- 41. Pubic Symphysis.
- 42. Obturator Forameu.
- 43. Head of Femur.
- 44. Neck of Femur.
- 45. Greater Trochanter.
- 46. Femur.
- 47. Patella Knee-pan.
- 48. Tibia.
- 40. Fibula.
- 50. External Malleolus.
- 51. Internal Malleolus.
- 52. Os Caleis,
- 53. Tarsus.
- 54. Metatarsal Bone.
- 55. Phalanges of Toes.





of the Toes.

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finger. The digits are provided with three phalanges each, except the thumb, which has only two. The thumb, however, has the advantage of moving freely on the carpus by means of a saddle-joint. The other carpal and metacarpal bones play slightly upon their fellows by means of gliding joints.

The pelvic girdle comprises the innominate bones, immovably united to the sacrum, posteriorly, by strong ligaments, and joined anteriorly in the median line. The innominate bone is composed of three bones (ilium, ischium, os pubis) which unite in adult life along a Y shaped line located in the cup of the hip-joint. Superiorly the *ilium* spreads out a broad concave surface, in which the intestines are supported; anteriorly the pubic bones reach the median line, beneath which are suspended the external genito-urinary organs; inferiorly the ischium, or haunch bone, forms the projection of the buttock and supports the body while sitting. Between the pubis and ischium is found the obturator foramen. This foramen is closed by the obturator membrane. The pelvis (or basin) furnishes the bony support upon which rest the contents of the abdomen, and is traversed by the outlets of the intestinal, genital, and urinary passages. The broad, expanded portion above is called the false pel-vis, and is part of the abdomen; the narrow, funnel-like portion below is the true pelvis, and contains the rectum, uterus, and blad-The pelvis of the woman is broader der. and much more roomy than that of the man. The lower extremities (the bones of which are thirty in number) join the innominate bones in the hip-joints. This articulation is bones in the hip-joints. This articulation is a perfect example of the ball and socket joint, the globular head of the femur fitting into the cup above mentioned. In addition to the supports afforded by a strong capsular ligament, by an additional rim of fibro-cartilage deepening the bony cup, by great muscles constantly drawing the cup and head together, and by atmospheric pressure resisting the separation of the two joint elements, there is also a round ligament found within the joint, uniting the femoral head to a depression in the bottom of the cup. The femur is the bone of the thigh, and is the longest bone in the human body. Unlike even most of the higher primates, the femur of man is longer than the tibia. We recognize a head, neck, angle, and trochanters (great and small) at the upper end of the shaft. At the lower end are two condyles (external and internal) articulating with the tibia and patella in the knee joint. The patella or kneepan is a sesamoid bone, placed in the tendon of the great quadriceps extensor muscle, at the point where the tendon glides over the external surface of the femur. The knee-joint is a compound articulation formed by a fusion of the femoro-patellar joint, with the two joints lying between the outer and inner condyles of the femur and the corresponding tuberosities of the tibis. Between the surfaces of the two latter joints are interposed two semilunar fibro-cartilages, and partly separating the mesial from the lateral joint are two crucial ligaments. A single synovial membrane is com-mon to all three joints. The femoro-patellar is a gliding joint; the femoro-tibial is a hingejoint, although the surfaces also glide and rotate. The leg contains two bones, tibia and The tibia or shin-bone is the heaviest fibula. bone of the leg, is internal and anterior to the fibula, is the only leg bone to articulate with the femur, and transmits the weight of the body to the tarsus. On the upper extremity are two tuberosities with concave surfaces for articulation with the femoral condyles, and between them a spine to which attach the crucial ligaments and the semilunar fibro-cartilages. In front is a tubercle for the tibial attachment of the patellor tendon. At the lower extremity is a horizontal, smooth surface for the astragalus, and projecting still lower on the inner side is the inner malleolus, The upper part of the astragalus is mortised into a three-sided space, open in front and behind, bounded above by the smooth surface just mentioned, internally by the inner malleolus, and externally by the outer malleolus or lower extremity of the fibula. The ankle is, therefore, a true ginglymus or hinge-joint allowing motion only in an antero-posterior direction. The fibula is a slender bone located on the outside of the leg, covered entirely by muscles except at its upper and lower extremities, articulating above and below with the tibia, and articulating with the astragalus as the outer malleolus.

The foot is made up of a series of bones ar-ranged in three groups: tarsus, comprising astragalus, os calcis, scaphoid, three cuneiform bones, cuboid; metatarsus, made up of five metatarsal bones; and five digits, in each of which are found three phalangeal bones except in the series attached to the great toe, which contains only two. The foot bones are grouped into arches supporting the weight of the body at the ankle joint through the me-dium of the astragalus. On the outside of the foot is an arch reaching from the os calcis to the fifth metatarsal bone and including the cuboid. On the inside of the foot is another arch comprising the os calcis, astragalus, scaphoid, internal cuneiform, and first metatarsal bones. In the crown of these two arches, fitting in like a keystone, is found the larger part of the astragalus, transmitting the weight of the body to the underlying foot. A third arch or dome is formed from side to side in the region of the ball of the foot by the five metatarsal bones, while the foot and leg are bound together by a series of ligaments admitting of motion only in an antero-posterior direction, the more complicated motions observed in the foot take place by gliding joints located between the tarsal bones.

The Muscular System.— The motive power by which the organism effects changes of position is furnished through the muscular system. Muscles are of two kinds: striped or voluntary, and unstriped or involuntary. For the anatomy of each, see *Histology*. Involuntary muscle occurs in the digestive tube, bladder, uterus, and is considered under those organs. We shall consider here those groups of striped

#### Anatomy

muscle by which voluntary motion is effected. Contractility is the essential property of muscle fiber. It is further essential to muscular action that the muscle acting shall be attached with reasonable firmness to the two or more points acted upon. These two points are called Origin and Insertion, the former term denoting the point which, for the time, remains stationary, the latter designating the point yielding to the pull. It should be noted, however, that all muscles attached at both ends to bone may take their base or origin from either extremity and pull toward the other end. Other muscles are attached at one end only to bone, the other end being attached to soft parts and invariably draw those parts toward the bone. Thus, the facial muscles draw the skin in various directions toward the skull. Muscles attached at both ends to bone furnish in almost all cases the power operating levers of any of the three classes. It is therefore a requisite that there shall intervene between the origin and insertion of these muscles, a joint, which shall be the balance upon which the fulcrum and the moving bone or lever are enabled to adjust the difference between power and load. In many cases, muscles skip one bone and two joints on their way from origin to inser-tion, and their action becomes thus compounded with the action of other muscles, which serve to steady the intervening bone, and enable the muscle to subserve two entirely different groups of motions. As muscles approach their terminal points, they become fibrous, the fibers grouping themselves into round cords or tendons, or flattening out into thin glistening sheets. We classify the muscles of the body broadly into a Dorsal and Ventral group, the former acting usually as ex-tensors, the latter as flexors, but the body has experienced so many changes in process of development, that this classification will hardly hold. Nor can we adopt any very lucid system of classification at present for the trunk and head muscles, so varied is their function. We therefore group and name these latter according to anatomical position as much as possible. In the extremities we distinguish the following groups of muscles: flexors, extensors, pronators (action illustrated by laying hand on table with palm down), supinators (palm up), adductors and abductors (drawing to or from the median line of the body), external and internal rotators (of arm and thigh).

Following are the principal divisions of the muscular system of the human body: between spine and upper limb, posteriorly; between ribs and upper limb, anteriorly; between shoulder girdle and humerus: between shoulder, arm, and forearm (flexors and extensors); pronators and flexors of forearm, hand, and fingers (ulnar side); supinators and extensors of forearm, hand, and fingers (radial side); muscles of the palm of the hand; muscles of the thumb; muscles of the little finger; between spine or pelvis, and femur; thigh to leg; thigh to leg or heel (flexors); leg to foot (flexor); leg to foot (abductors and extensors);

#### Anatomy

dorsum of foot; plantar surface of foot; great and little toe muscles; muscles of scalp; muscles of orbit and eye; muscles of expression, in addition to the muscles of mastication; muscles of the plate; muscles of the tongue; muscles of the pharynx and larynx; muscles of head, neck, and trunk (lateral to spine, posterior to spine); muscles of thorax (respiratory); muscles of the abdomen (support, respiration, draw thorax to either side or forward); and muscles of pelvic outlets.

In connection with the muscular system we note a series of broad sheets of fibrous and connective tissue surrounding and separating the layers of muscles from one another, and defining the various regions of the body. These sheets of membrane become in many cases of vast importance to the surgeon, since within their meshes are contained usually the great nerves or blood-vessels of the body on the way from region to region; thus, the deep cervical fascia not only binds the muscles and other organs together, but passes with the trachea and œsophagus as well as the large vessels and nerves downward into the thorax and continues there to bind these structures to the heart, lungs, and pericardium. In many cases also the fascias, by virtue of their excessive thickness and firmness serve to support the contour of the limbs. Again, we find the more superficial fascias giving off thick, fibrous sheets, which pass to the bone between the anterior and posterior muscles of the limb. Other fascias occur as membranes lying between the parallel bones of arm and leg, and are there designated as interosseus membranes.

Circulatory System.—The circulatory system consists of a double pump connected with a series of tubes, propelling and conveying blood (see Histology), through the medium of which the tissues are nourished and oxygenated, and by which waste products are carried from the tissues to the excretory organs. Under Circulatory System we consider Heart, Arteries. Veins, and Lymphatics.

The Heart is a conical organ, located centrally in the thoracic cavity with the base directed upward and backward, the apex directed forward and to the left, and is surrounded by a serous sac called the *pericardium* within which it moves freely, except at the base where the sac is pierced by the aorta, venæ cavæ, and pulmonary vessels. Each half of the pump comprises a receiving chamber or auricle, and a propelling chamber or ventricle. These two pumps, pulmonary and systemic, are situated, the one on the right and the other on the left side of the heart; although in the development of the body the right side has come to lie more anteriorly. The right side of the heart receives venous or impure blood. This blood, received first into the auricle, is propelled through the tricuspid valves into the ventricle and passes thence through three pulmonary semilunar valves into the pulmonary artery and the lungs. Having become oxygenated in the lung, the pure blood is returned to the left auricle by pulmonary veins. A pair of mitral valves

#### Anatomy

directs the blood current into the left ventricle and prevents its return to the auricle. The thick, muscular walls of the left ventricle propel the blood still farther through three semilunar or aortic valves into the aorta. The muscle of which the heart is composed, while involuntary in its action, possesses many of the histological properties of striped muscle fiber, disclosing the striated appearance of the latter, but also showing an intricate system of communication between fiber and fiber never found in voluntary muscles.

Arteries.-In the middle coat of the arteries into which the blood is propelled by the heart, is found the homologue of the heart muscle existing as a series of circular unstriped muscle fibers. These fibers in all probability furnish the basis from which the heart muscle was developed, for while the fibers lack the stripes of voluntary muscles, they possess the intricate interlacing arrangement, and the elongated nuclei, of the heart muscle. We distinguish in the artery three coats or tunics; the internal coat, made up of a basement membrane supporting a layer of shining, flat, epithelial cells along which the blood current can glide smoothly; the middle coat, containing the circular muscle above mentioned; and the external coat, made up of interlacing fibers and connective tissue, passing gradually into the fascia usually found surrounding a blood-vessel. In the sorta are found very few of the muscle cells, but these are replaced by numerous fibers of yellow elastic tissue.

Branching of Arteries. - The arterial blood, propelled through the ascending aorta, is carried to the aortic arch, situated at the root of the neck in front of the trachea and œsophagus. From the arch of the aorta are given off in order the innominate artery, dividing into right carotid and subclavian, and left carotid and subclavian vessels. The common carotid arteries take an upward course from the neck to the head, giving off no branches until they divide into external and internal carotids. The external carotid gives off many branches sup-plying the upper part of the neck and super-ficial portions of the head (superior thyroid, lingual, facial, occipital, temporal, and internal maxillary); the internal carotid artery supplies the brain and orbit, giving off cerebral and ophthalmic branches. The subclavian artery ascends for a short distance into the neck behind the clavicle, arching over the first rib, and giving off a vertebral artery ascending into the skull to join the posterior branches of the internal carotid. Other branches of the subclavian pass to the neck and inner wall of the chest. The subclavian artery, passing into the region of the shoulder behind the clavicle, becomes the axillary space, or armpit, and the inner aspect of the arm. At the front of the elbow, the brachial artery divides into radial and ulnar, which pass down the outer and inner side of the front of the forearm. These two ar eries in the palm of the hand unite as superficial and deep palmar arches. The palmar arches furnish the most perfect examples of the interlacing and union of arte-

### Anatomy

rial branches to be found in the body. By means of interlacing, the system is enabled to correct temporary inequalities in the circulation of any given part; for when through any cause, let us say, the radial artery is obstructed, the blood is enabled to reach the palmar arches by way of the ulnar channel. The arch of the aorta is continued downward along the front of the thoracic spine as the descending tho-racic aorta, giving off in this region the inter-costal arteries. Perforating the diaphragm, the thoracic becomes the abdominal aorta, and gives off the cœliac axis supplying the liver, stomach, spleen, and upper bowels; the inferior-mesenteric supplying the lower bowels; renal arteries supplying the kidneys; spermatic arteries supplying the ovaries or testicles, and certain small arteries supplying the muscles of the loin. Over the fourth lumbar vertebra the aorta divides into right and left common iliac arteries, supplying the lower extremities and the pelvic organs. Each common iliac divides presently into external and internal iliac branches; the latter passing deeply into the pelvis to supply the bladder, rectum, and structures of the pelvic outlet, including the gluteal region, or buttock, and the sciatic nerve. The blood reaches the lower extremity through the external iliac vessel, entering the anterior aspect of the thigh underneath Poupart's ligament, at which point the iliac becomes the common femoral artery. A common femoral artery passing down the anterior aspect of the thigh, presently gives off a deep femoral artery to supply the deeper structures of this region. The superficial femoral, the main trunk, winds around the inner aspect of the thigh from front to back until it comes to lie behind the knee-joint. About two inches below the kneejoint this artery divides into anterior and posterior tibial arteries; the anterior tibial passing above the interosseus membrane and to the front of the leg and foot; the posterior tibial continuing down the posterior aspect of the leg, under the calf muscles, to a point behind the inner malleolus, where it enters the sole of the foot as the external and internal plantar arteries.

Capillaries.-The arteries terminate in a fine network of blood-vessels, in which we find remaining only the internal coat of the artery, and, in some cases, only the epithelial portion of that coat. The blood, on reaching the capillaries, allows its liquid constituents and a few of the white corpuscies to escape through spaces between epithelial cells. These liquid constituents are presently collected again, after parting with their nutriment and taking up waste products from the tissues, into lymphatic vessels, which are found as delicate networks and spaces throughout the body. At certain points in this lymphatic network are located lymphatic glands, which serve as strainers to prevent the re-entrance of poisonous or foreign material into the system; thus, in the groin, in the axillary space, in the neck, in the abdominal and thoracic cavities are located groups of these lymphatics, which are inconspicuous in
health, but in disease become enlarged and inflamed in the effort to dispose of dangerous material. The larger portion of the lymphatic fluid, however, is collected into small channels, of which the thoracic duct is the largest, and reaches the general circulation again through the veins of the neck.

Veins.-The corpuscular elements of the blood do not leave the capillaries, but are collected into vessels of gradually increasing size known as veins. Veins differ from arteries in the thinness of their walls, in the presence of valves, and in the fact that they carry blood in which the oxygen has been replaced by carbon-dioxide. The thinness of the veins is due to the fact that the middle coat, which in the artery contains circular, muscular, and elastic fibers, is almost entirely absent, so the vein lacks not only the property of contrac-tility found in the artery, but is so inelastic that its walls collapse immediately when emptied of blood. Veins follow the same course as arteries, and as a rule receive the same names. In the lower extremity, however, we find two superficial veins. In the upper extremity the superficial veins are known as *cephalic* and *basilic*. It is from the latter vein that the blood is taken in the operation of blood-letting. Within the skull the venous blood is accumulated into great channels lying within the dura mater, and in the neck the large venous channels are known as external and internal jugular veins. The jugular and subclavian veins from either side of the body unite into right and left innominate veins, which pour the blood into the descending vena cava. The blood from the lower part of the body is collected into the ascending vena cava. It is to be noted, however, that the venous blood from the stomach and intestines, is collected into the large portal vein, and through this vein is carried a second time to capillaries located in the liver, from which an hepatic vein carries it into the ascending vena cava. The course taken by the venous blood from the stomach, intestines, and liver to the vena cava is known as the Portal Circulation.

Nervous System.-Within the bony arches, which, we have said, are thrown backward from the bodies of the vertebræas well as from that cranio-facial axis of the skull which is supposed to correspond in some measure to the vertebral bodies, is a neural canal, so-called because it contains the larger portion of the central nervous system. We divide this system into two portions, the one contained within the neural canal, comprising the brain and spinal cord, and known as the cerebro-spinal axis; the other made up of nerve fibers passing to and from this axis, lying external to the neural canal, and called peripheral nerves. In addition to these two sets of nerve structures, classed together as the cerebro-spinal nervous system, the body is served also by a group of nerves made up of conducting fibers, and central cells collected into ganglia at various points, and called the sympathetic nerrous system. This latter system appears to control the purely

vegetative functions of the body, such for instance as digestion, nutrition, elimination, etc. The cerebro-spinal system controls actions of which the brain or the individual is cognizant. The functions in which the central nervous system takes part, may be divided into those (a) in which sensation and its modifications are the essential features, represented by a series of fibers passing toward the central nervous system and known as *afferent* nerves: and (b) motor impulses, or their modifications. represented by a series of fibers passing from the central nervous system, known as efferent nerves. In addition to these peripheral trunks, made of white nerve fibers, or axis cylinders, many of which are contained not only in the peripheral nerves, but within the substance of the spinal cord, and pass upward as far as the gray matter of the brain, the nervous system contains many cells constituting the gray substance, distinctly central in their character, within which the impulses conveyed to and from the periphery are elaborated. These cells are the essential features of the central nervous system, and all fibers passing thereto, whether located in the brain, spinal cord, or are distinctly peripheral. See *Histology*. Peripheral Nerres.—Springing from the cen-

tral nervous system and passing symmetrically to either side of the body, are forty-three pairs of peripheral nerves, some of which contain purely afferent or sensory fibers, some contain efferent or motor fibers, and some are called mixed nerves because they contain both motor and sensory tracts. There are forty-three of these paired nerve trunks, and it is supposed that they indicate, in some manner, an arrangement of the body into segments corresponding, at least in the trunk, to each pair of supplying nerves. Thirty-one pairs spring from the spinal portion of the neural axis and are classed as spinal nerves; twelve pairs spring from the brain, and passing out through openings in the cranium are called *cranial* nerves. Of the twelve cranial nerves we note the following points: 1, Olfactory nerve, an efferent nerve supplying the special sense of smell, arising from the olfactory lobe of the brain, emerging from the skull through a series of small openings in the ethmoid (or sieve) bone, and distributing its filaments over the mucous membrane of the upper part of the nose. 2, Optic nerve, a sensory nerve supplying the retina, or organ of vision, arising from the optic thalamus on either side, crossing to the opposite side, interlacing with the fibers of the opposite nerve, and emerging from the cranial cavity through the optic foramen, enters the orbit and terminates in the back part of the eyeball. 3, Motor oculi, or third nerve, a nerve of motion, arising from the inner side of the crus cerebri, passing into the back part of the orbit to all the muscles of the eyeball except the ex-ternal rectus and superior oblique. 4. The Patheticus or trochlear nerve, arising from the base of the brain near the origin of the preceding nerve, and supplying the superior



# Nerves of the Posterior Surface of the Lower Extremities.

1. Large Cluteal Muscle. 2. Small Gluteal Muscle. 3. Upper Gluteal Muscle. 4. Lower Gluteal Muscle. 5. Square Crural Muscle (or Four-cornered Muscle of the Thigh). 6. Sciatic Nerve. 7. External Popliteal Nerve. 8. Internal Popliteal Nerve. 9. Popliteal Artery. 10. Gastrocnemius Muscle. 11. Posterior Tibial Nerve. 12. Tendon Achilles. 13. External Saphenous Nerve. 14. Os Calcis. 15. Inner Plantar Nerve. 16. Outer Plantar Nerve. 17. Nervesof the Toes.



# Nerves of the Forearm and Hand. Upper Side.

 Radial Nerve, 2. Radial Artery, 3. Median Nerve, 4. Ulnar Nerve, 5. Ulnar Artery, 6. Deep Palmar Arch. 7. Thenar Muscle. 8. Hypo-Thenar Muscle. 9. Cutaneous Nerves of Thumb. 10. Flexor Tendons of Fingers. 11. Cutaneous Nerves of Fingers.



# FRONT VIEW OF THE CHEST.

# Divided perpendicularly.

I. Lower Jaw. 2. Os-Hyoides. 3. First Rib. 4. Seventh Rib. 5. Cartilages of False Ribs. 6. Tenth Rib. 7. Larynx. 8. Trachea. 9. Branches of the Bronchus of the Left Lung. 10. Right Ventricle of the Heart. 11. Left Ventricle of the Heart. 12. Right Auricle. 13. Left Auricle of the Heart. 14. Pulmonary Artery. 15. Aorta. 16. Superior Vena Cava. 17. Left Lung, with its Branches of the Bronchus and Bloodvessels. 18. Pleura. 19. Diaphragm or Midriff. 20. Liver. 21. Great Omentum. 22. Cervical Nerves.



# THE ABDOMEN.

After Removal of Integument and Omentum.

1. Stomach, 2. Cardiac Orifice of Stomach. 3. Fundus of Stomach. 4. Pyloric End of Stomach. 5. Duodenum. 6. Right Lobe of Liver. 7. Left Lobe of Liver. 8. Gall-Bladder. 9. Common Bile Duct. 10. Spleen. 11. Small Intestine. 12. Transverse Colon of Intestine. 13. Descending Colon. 14. Sigmoid Flexure of Colon. 15. Urinary Bladder. 16. Urethra, with Corpus Spongiosum. 17. Spermatic Cord and Testicle. 18. Seventh Rib. 20. Twelfth Rib. 20. Crest of the Ilium. 21. Peritoneum, with the Ligaments of the Bladder. 22. Diaphragm. 23. Suspensory Ligament of the Liver. 24. Coeliac Axis. 25. Portal Vein. 26. Femoral Artery. 27. Femoral Vein. 28. Anterior Crural Nerve. 29. Superficial Nerve of the Thigh.





# THE BRAIN

## Removed from the Skull and cut through perpendicularly from right lo left.

1. Cortex Cerebri, 2. Brain-substance of the Large Hemispheres of the Brain. 3. Longitudinal Fissure. 4. Corpus Callosum, 5. Fornix. 6. Lateral Ventricle. 7. Optic Thalamus. 8. Third Ventricle. 9. Island of Reil. 10. Claustrum. 11. Tegmentum. 12. Ammon's Horn. 13. Pons.

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# The Brain seen from below. (Base of the Brain.)

1. Left Front-Lobe. 2. Right Front-Lobe. 3. Olfactory Nerve. 4. Fissure of Sylvius 5. Right Middle-Lohe. 6. Hypophysis. 7. Optic Nerve. 8. Optic Chiasm. 9. Tuber Cinereum. 10 Fourth Nerve. 11. Nerve of the Trochlear Muscle. 12. Fifth Nerve. 13. Sixth Nerve. 14 Facial Nerve, Auditory Nerve, Glosso-Pharyngeal and Vagus Nerve. 15. Accessory Nerve. 16. Hypo-Glossal Nerve. 17. Pons. 18. Medulla Oblongata. 19. Left Half of Cerebellum. 20. Right Half of Cerebellum.

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# Nerves of the Head and Neck that lie deep.

1. Trochlear Nerve. 2. Third Nerve. 3. Ophtbalmic Ganglion. 4. Gasserian Ganglion. 5. First; 6. Second; 7. Third Branch of the Fifth Nerve. 8. Meckel's Ganglion, 9. Upper Back Tooth Nerve. 10. Nerve of the Lower Socket of the Eye. 11. Submaxillary Nerve with Nerves of Lower Teeth. 12. Lingual Nerve. 13. Buccinator Nerve. 14. Submaxillary Gland, 15. Lower Jaw partly laid bare. 16. Vagus Nerve. 77. Facial Nerve. 18. Sympathetic Nerve. 19. Accessory Nerve. 20. Third Cervical Nerve.

#### Anatomy

oblique muscle of the eyeball. 5, A mixed nerve, dividing before emerging from the cranial cavity into three branches, hence called trifacial or trigeminal nerve. The upper branch supplies the region of the orbit and forehead, the middle branch supplies the region of the nose and the upper jaw and teeth, and the lower branch supplies the lower jaw and the teeth contained within it, also carrying the fibers of the gustatory nerve to the tongue. The lower branch also contains the only fibers of the fifth nerve which are motor in their function. 6, Abducens oculi, a nerve of motion, supplying the external rec-tus muscle of the eye. 7, Facial nerve, a motor nerve presiding over the muscles of the face, arises from the side of the medulla ob-longata near the fourth ventricle, becomes very intimately associated with the eighth nerve in the petrous portion of the temporal bone, and presently leaving that nerve, emerges on the face at the base of the temporal bone. On the face, this nerve divides within the substance of the parotid gland into many branches, supplying the muscles of the ear, the muscles of the eyelid, of the nose, mouth, and a few of the muscles of the neck. 8, Auditory nerve, an afferent nerve carrying fibers from the ear, or auditory organ, arises from the medulla, and is distributed to the organ of hearing. 9, Glosso-pharyngeal, a mixed nerve containing sensory fibers (probably of taste) from the tongue, and carrying motor fibers (probably) to the pharynx.. These fibers originate in the medulla near the fourth ventricle, and pass out through the jugular foramen, together with the tenth and eleventh nerves, between the branches of the internal jugular vein. This nerve lies very deeply in the back part of the throat under cover of the parotid gland, and sends branches to the pharyngeal muscles and the posterior half of the tongue. 10, Pueumo-gastric nerve, or vagus, so called from its extensive distribution to the lungs, heart, and stomach; arises within the medulla, emerges from the cranial cavity with the ninth and eleventh nerve through the jugular foramen, passes very deeply into the neck. and lies closely associated with the carotid vessels. In the neck, it is probable that this nerve sends out a number of branches to the pharyngeal muscles. It sends branches also to the muscles of the larynx. Very slightly diminished in size, it passes from the neck into the chest, and there supplies numerous branches to the heart and root of the lung. The nerve then leaves the chest in company with the cosophagus and supplies branches to both sides of the stomach. It will thus be seen that this nerve supplies the pharynx, larynx, trachea, lungs, heart, œsophagus, and stomach. 11, Spinal accessory nerve is a nerve containing many motor fibers, and (probably) a few sensory fibers. Portions of this nerve pass to the muscles of the pharynx by way of fibers which enter the pneumogastric nerve; the main trunk of the nerve passes backward in the neck to supply the trapezius and sterno-mastoid. 12, Hypoglossal nerve,

a nerve of motion supplying the depressors and elevators of the hyoid bone, and many of the muscles of the tongue, arises in the medulla and emerges from the skull through the anterior condyloid foramen. This nerve has a somewhat superficial course in the neck, lying at one point upon the external carotid artery, and there dividing, sends one set of fibers to the depressors of the hyoid bone, and another set directly forward to the elevators of the hyoid bone and the muscles of the tongue.

Spinal Nerves.-Springing from the side of the spinal cord are thirty-one pairs of nerves, of which we find eight in the cervical region. twelve in the thoracic, five in the lumbar. five in the sacral, and one in the coccygeal region. Each nerve springs from the cord by two roots, a posterior, made up of afferent fibers; and an anterior, carrying motor fibers. On the posterior root is found a ganglionic enlargement. The fibers from the two roots uniting, emerge through intervertebral foramina and divide externally to the spine into anterior and posterior divisions, each containing both motor and sensory fibers. The dorsal divisions of the spinal nerves are small, do not join one another into important plexuses, and their distribution is, in a great measure, limited to corresponding segments of the muscles of the back and overlying skin. The anterior divisions of the spinal nerves are large and important, especially in the cervical, lumbar, and sacral regions. In the thoracic region the anterior divisions of the spinal nerves pass forward between the ribs, preserving in a great measure the undisguisedly segmental character of that region. In the other regions, however, the anterior nerves on emerging from the spinal column, blend immediately into great plexuses made up of interlacing fibers of the adjacent spinal We distinguish the following plexuses nerves. formed from the anterior primary divisions of spinal nerves: 1, a cervical plexus made up of the first four cervical nerves, and supplying the muscles and skin of the neck; 2, a brachial plexus made up of the anterior divisions of the lower four cervical nerves, and a large part of the first dorsal nerve. These nerves unite into three cords, which surround the axillary artery and presently divide into branches supplying the shoulder and upper extremity. They also supply the neck, superficial portions of the chest, the arm, and forearm. The muscles of the back of the arm are supplied by a great nerve which winds around the back of the humerus, presently emerging near the elbow on the interior and external portion of the forearm. The greater number of the muscles in the palm of the hand are supplied through the ulnar nerve, which, coursing down the inner side of the arm and forearm, supplies two of the forearm muscles with motion, and supplies sensation to the remainder of the palmer aspect of the hand. 3, The lumbar plexus is made up of the anterior division of the first four lumbar nerves, supplying motion and sensation to the muscles and skin of the abdomen and the anterior aspect of the thigh. 4, Sacral plexus is made up of portions of the

7

fourth and fifth lumbar nerves, and the first, second, and third, with a portion of the fourth sacral nerves. This plexus supplies motion and sensation to the pelvic outlet, to the posterior aspect of the thigh, to the buttock, and to the leg and foot with the exception of that portion of the skin which is supplied with sensation through the internal saphenous nerve.

sation through the internal suphenous nerve. Sympathetic Nervous System. — The sympathetic system comprises two gangliated cords lying on either side of the vertebral column throughout the trunk. In the thoracic region there are twelve ganglia on each side; in the cervical region there are but three; in the lumbar and sacral regions there are eight or nine, and the system terminates in a median ganglion located on the front of the coccyx. These ganglia are connected with one another by communicating fibers and are also connected with the anterior divisions of the spinal nerves. In addition to the function of visceral control already mentioned, this system governs the blood-vessels by means of vaso-motor fibers, and sends other fibers also to the heart (increasing usually the pulsations of this organ), so that the sympathetic nervous system may be considered to regulate the action of the unstriped muscle fiber throughout the body, as well as the action of glandular organs. In addition to what may be called the central portion of the sympathetic nervous system, networks of communicating fibers surround all the large blood-vessels, governing their action and communicating with the cerebro-spinal nerves located in the vicinity. Branches from the three cervical ganglia surround the carotid artery and descend as cardiac branches into the thorax to the heart, apparently exercising an action antagonistic to the cardiac branches of the pneu-mogastric nerve. From the thoracic portion of the sympathetic system, branches pass downward through the diaphragm into the abdomen. These nerves communicate with a solar or epigastric plexus resting upon the ab-dominal aorta, and govern the action of the digestive system. Fibers radiate from the semilunar ganglia and solar plexus in the direction of plexuses located on the various abdominal organs; thus we find diaphragmatic, supra-renal, renal, cœliac, hepatic, coronary, splenic, mesenteric, spermatic, ovarian, hemorrhoidal, vesical, prostatic, cavernous, vaginal, and uterine plexuses, governing the nutrition, blood supply, and vegetative life of the va-rious organs. In addition to these ganglia found in the sympathetic cord, and to be considered as belonging exclusively to that sys-tem, there are a number of enlargements found on the spinal and cranial nerves, which contain gray cells and appear to be capable of functioning up to a certain point, as a part of the central nervous system — probably governing local reflex actions. Into some of these ganglia we find three kinds of nerve fibers passing, motor, sensory, and sympathetic, from adjacent trunks. The cerebro-spinal axis is made up of the brain and spinal cord enclosed within three membranes, dura mater,

arachnoid, and pia mater. Of these membranes, the dura mater, tough and fibrous, is the most superficial and separates the nervous axis from the overlying bone. At certain points within the skull the dura mater is reflected away from the bone and comes to lie between portions of the brain. The dura mater of the cranium is adherent to the skull and serves as the periosteum; in the spinal canal, however, the dura mater takes only an occasional attachment to adjacent vertebræ by way of support. Beneath the dura mater is found the second membrane, or arachnoid mater, from which is secreted the watery cerebro-spinal fluid found on penetrating the dura mater. Beneath the arachnoid is found the third covering of the cerebro-spinal axis, the pia mater, which supports the blood-vessels supplying the brain and cord, and consists of a very delicate network of white fibrous tissue from which the vessels pass into the nerve tissue. At certain points where ventricles or cavities exist in the cerebral structure. the pia mater becomes fringed.

Spinal Cord. — The spinal cord is that portion of the cerebro-spinal axis lying within the spinal column, but is continuous into that portion of the brain called medulla oblongata without any line of separation. From its commencement at the foramen magnum to its termination near the first lumbar vertebra. it is about seventeen inches in length, and terminates in a bundle of nerve fibers, which pass to the lower end of the sacrum within the spinal canal. The human spinal cord is about eight millimeters in diameter, but there are enlargements in the cervical and lumbar regions corresponding to the points at which the brachial and lumbar plexuses are given off. The cord is traversed from one end to the other by two deeper fissures, anterior and posterior median, which lie in the median line of the cord in an antero-posterior plane. The substance of the cord comprises gray and white nerve matter. The gray substance is composed largely of nerve cells lying in the interior, and having roughly the appearance of the letter H; the white substance, made up entirely of conducting fibers running in a direction parallel to the long axis and filling in the contour of the cord, is poured in, as it were, around the outside of the H, or gray substance. Between the two lateral halves of the cord, at a point where the anterior and posterior median fissures do not meet, are found two series of transverse fibers called commissures, connecting the lateral halves of the gray and white substance respectively. Microscopical and experimental investigation has shown that the white substance, apparently homogeneous, is made up of definitely grouped collections or columns of nerve fibers passing upward to the brain from the periphery, or downward to the periphery from the brain. Investigation also shows that the gray substance is made up largely of tracts and groups of nerve cells controlling certain automatic functions of the body which are not directly dependent on cerebral control.

The brain comprises that portion of the nervous system contained within the cranial cavity, with the exception of such portions of the twelve cranial nerves as lie between the brain and their foramina of exit. The human brain is larger and heavier, not only in proportion to the weight of the body, but in actual mass, than that of any other animal except the elephant and some of the whales. The average male European brain weighs about 50 oz., that of the female about 45 oz. Since the height and weight of the average woman is about eight per cent. less than that of the average man, it appears to be a fact that the average female is possessed of a smaller brain capacity than the average man. In the infant at birth the brain weighs about 10 oz. and continues to increase in size until about the eighth year. The weight, however, increases until middle life. The largest brain is said to have been that of Cuvier, about 64 The smallest brain of an intelligent individual weighs about 35 oz. Among idiots, however, brains have been found with a weight as low as 8<sup>1</sup> oz., and, on the other hand, the brain of an idiot has been observed to weigh as much as 60 oz. Among the lower races of mankind, the average weight is distinctly lower, ranging in males from 45 to 42 oz. It may be remarked in passing that the weight of the brain of the gorilla is about 30 oz. The brain is composed of the Cerebrum, Cere-bellum, Pons Varolii, and Mcdulla Oblongata.

The Medulla Oblongata is that portion of the brain lying most inferiorly, continuous at the foramen magnum with the spinal cord and joined above with the cerebellum and cerebrum by fibers contained in the inferior crura cerebelli and ponsvarolii. It is pyramidal in shape, about an inch long, and rests upon the basilar process of the occipital bone. It is in reality simply the expanded upper portion of the spinal cord, but containing more numerous and more important centers and groups of nerve cells than are contained in the cord proper; thus, many of the motor and sensory cranial nerves have their points of origin buried deeply in the substance of the medulla. The centers governing respiration, the action of the heart and blood-vessels, and many of the functions of digestion, secretion, and nutrition, are found in the medulla. The intimate structure of the medulla is composed of a series of white columns, continuous with the columns of the cord below, and with the pons varolii and peduncles of the cerebellum above. In the me-dian line anteriorly are found sets of fibers passing from one side to the other in what is known as the pyramid. Posteriorly, ascending fibers pass upward from what is known as the restiform body, and, diverging to enclose the fourth ventricle, terminate in the cerebellum, constituting the inferior peduncles of that body. The point at which these fibers diverge is called the Calamus Scriptorius. In the lateral portion of the medulla are found white fibers in a lateral tract, continuous with the same tract of the cord, and an olivary body consisting of an oval mass of white fiber enclosing gray nerve cells. Other bundles of fibers continuous with corresponding bundles in the cord pass upward into the substance of the medulla; bound together by these bundles are the groups of nerve centers above mentioned, represented by gray nuclei. The H shaped arrangement of the gray matter in the cord is lost in the medulla, and gives place to gray nuclei located here and there among the white bundles.

Pons Varolii.— Above and interior to the medulla oblongata is the pons Varolii, made up almost entirely of white connecting fibers passing between various divisions of the brain.. The pons is further situated between and anterior to the lobes of the cerebellum, with which it is connected by the middle peduncles of that structure. Within the pons are found alternating layers of transverse and longitudinal white fibers, the transverse fibers being continuous with the middle peduncle of the cerebellum, the longitudinal fibers are communicating tracts from the medulla, passing upward into the crura cerebri.

The Cerebellum is that portion of the brain which lies posteriorly to medulla and pons, and below the posterior lobes of the cerebrum in the inferior occipital fosse. Separating the cerebrum from the cerebellum is the tentorium cerebelli, and between the two cerebellar lobes is located the falx cerebelli. The cerebellum weighs about one eighth as much as the cerebrum, but is larger in proportion in infants and the lower animals. The white matter of the cerebellum is located internally, the gray matter externally. The convolutions are very numerous and lie in narrow, transverse folds, separated by numerous deep fissures placed very closely together, and appear to possess very little of the distinctive character of the fissures and convolutions of the cerebral hemispheres. The cerebellum is divided into three large lobes, a middle and two lateral, the middle lobe being called the worm or vermis, and the two lateral lobes the hemispheres. These lobes cannot be separated from one another, so that the cerebellum may be described as two large lobes connected perpendicularly by a smaller median ridge, the ridge constituting the middle lobe or vermis. A median section of the cerebellum discloses the great depth of the cerebellar fissures. The surface of the fissures is composed entirely of gray matter, and running toward this from the interior of the cerebellum is the white substance, arranged in a branching manner and called therefore Arbor Vitæ. The fourth ventricle is a lozenge-shaped cavity located between the medulla and pons anteriorly, and the cerebellum posteriorly. The floor or an-terior aspect of this ventricle is diamond shaped, formed by the posterior aspect of the medulla and pons. It is continuous below with the central canal of the spinal cord; above, it is continuous with the ventricles of the brain through the Sylvian aqueduct. The fourth ventricle is closed laterally by the points of contact between medulla, pons, and cere-bellum. Within the fourth ventricle are

located the gray nuclei before mentioned, of the fifth, sixth. seventh, eighth, ninth, tenth, and eleventh cranial nerves. Somewhat below the fourth ventricle is found the nucleus for the twelfth nerve, and somewhat above the ventricle, in the floor of the aqueduct of Sylvius, are found the nuclei for the third and fourth nerves.

The Cerebrum is the largest portion of the brain, is supported in the anterior and middle fosse of the skull, rests posteriorly on the tentorium cerebelli, and is covered above by the dome of the cranium. It is divided into lateral and symmetrical hemispheres, partly separated by the falx cerebri lying in the great longitudinal fissure, and joined more deeply by a great commissure or bridge passing across the median line, known as Corpus Callosum. The outer surface, composed entirely of gray matter, or cortex, is arranged into lobes and convolutions separated by fis-The cortical layer, seen also in the aures. ventricles, is composed of alternate strata of gray and white matter, the entire layer being about one-sixth of an inch thick. The true Interior of the cerebrum is composed of white matter. Before describing the interior structure it is important to note the larger of the lobes and fissures. There are five great lobes, separated by fissures varying from half an inch to one inch in depth. The most important of the fissures are: Sylvian, running upward and outward along the outside of each hemisphere: the fissure of Rolando, commencing at a point a little behind and above the point of junction of the ascending and horizontal limbs of the fissure of Sylvius, and extending upward and backward to a point somewhat behind the parietal eminence; the parieto-occipital fissure, found still farther back. The five lobes of the cerebrum are as follows: frontal lobe, lying in front of the ascending limb of the fissure of Sylvius; parietal lobe, lying between the fissure of Rolando, the parieto-occipital fissure, and the horizontal part of the fissure of Sylvius; occipital lobe, constituting the posterior extremity of the hemispere, and separated from the parietal lobe by the parieto-occipital fissure; temporosphenoidal lobe, in the middle fossa of the skull below and behind the horizontal limb of the fissure of Sylvius: central lobe, or Island of Reil, on the outer surface of the cerebrum, and not visible upon the convex surface. The lobes are divided into many convolutions and gyri by secondary fissures running into those already mentioned. The importance of a study of the convolutions is becoming increasingly obvious, for experimental science has demonstrated beyond question that the gray matter found in each convolution presides over some definite function or portion of the body; thus it is a fact not to be questioned, that certain convolutions in the frontal lobes control the function of speech, certain others control the motions of the head and extremities on the opposite side of the body. The lateral ventricles are lined by a thin serous membrane and contain a small amount of cerebro-spinal fluid.

They are separated in the median line from one another by a thin partition, and each ventricle is divided into a body, and anterior. posterior, and middle cornua. Below the corpus callosum is a mass of white matter made up of longitudinal commissural fibers diverging in front and behind to form anterior and posterior pillars. Behind the anterior pillars of the fornix and below the body, is the foramen of Monro, connecting each lateral ventricle with the anterior part of the third ventricle. Passing through this foramen into the third ventricle and extending into either lateral ventricle, lying in what is known as the great transverse fissure of Bichat, is the velum interpositum, a process of pia mater from which originate the choroid plexuses of the third and lateral ventricles. The posterior boun-dary of the foramen of Monro is the optic thalami, two masses composed externally of white and internally of grav matter. The white and internally of gray matter. thalami form also the lateral boundaries of the third ventricle. The floor of the third ventricle is formed by the lamina cinerea, infundibulum, corpora albicantia, and posterior perforated space. Crossing the third ventricle are three sets of transverse fibers, commissures, joining the optic thalami. Directly behind the third ventricle, and in the Sylvian aqueduct, is the pineal gland, a small reddish body about the size of a split pea and containing a clear albuminous liquid and minute phos-phatic calculi called brain sand. Above the Sylvian aqueduct and forming its roof are four bodies, ranged in pairs, known as corpora quadrigentina, masses of gray matter with a thin covering of white fibers. Resting against the back part of each thalamus and external to the corpora quadrigemina, are the geniculate bodies, two small masses of nerve tissue, called external and internal, and separated from each other by a portion of the optic tract. Especial attention should be directed to the fact that the cavities of the brain and spinal cord are directly continuous; thus, we may trace the central canal of the cord into the fourth ventricle, into the Sylvian aqueduct and third ventricle, and thence through the foramen of Monro into the lateral ventricles. This continuity arises from the method by which the nervous system is developed, a central nerve tube running from a very early period throughout the entire length of the body, around which presently appear enlargements of nerve tissue corresponding to the various anatomical divisions of the adult brain. The lateral ventricles of the cerebral hemispheres are pushed forward and outward from each side of the anterior extremity of the central tube.

Organs of Special Sense comprise: the Nose, or organ of smell, containing terminal fibers of the first or olfactory nerve; the Eye, or organ of sight, supplied by the second or optic nerve; the *Tongue*, or organ of taste, supplied by the gustatory branch of the fifth nerve, and the lingual branch of the glosso-pharyngeal nerve; and the Ear, or organ of hearing, supplied by the eighth or auditory nerve. In ad-

dition to these nerves of special sense, localized in their distribution, the skin is supplied with tactile corpuscles, very largely distributed, and presiding over the sense of touch. It is probable that the nerves of smell, hearing, sight, and taste are merely highly specialized modifications of the nerves of touch.

The organ of smell is contained within the nose, and is found in the Schneiderian (mucous) membrane covering the bones and cartilages of the nasal fossæ. The openings of the nose are the nares, anterior on the face, and posterior into the pharynx. Dividing the nose into two more or less equal and parallel fossæ, is a median osseo-cartilaginous septum extending in an antero-posterior plane. Into either fossa project from the lateral aspect the three turbinal bones, twisted like scrolls and covered by the Schneiderian membrane. Upon the walls of the superior meatus only, are found the terminal filaments of the olfactory nerve, thus explaining why it is necessary to inhale deeply into the nose before the sense of smell can be excited by delicate odors. Opening into the nose are the lachrymal canal from the orbid, and the apertures of the frontal, ethmoidal, sphenoidal, and maxillary sinuses.

The Eye is the organ of sight, and with its appendages is located within and in front of the orbit. The appendages include the eyebrows, two projecting lids, and the lachrymal apparatus. Opening on the inner aspect of each lid are lachrymal ducts, conveying the tears from a lachrymal gland, located in the upper and outer segment of the orbit above the upper lid. The tears, after moistening the eye. are carried into a lachrymal sac beneath the inner angle of the lids, by means of two lachrymal canals commencing on the inner extremity of each tarsal cartilage. From the lachrymal sac, the tears fall into the inferior meatus of the nose through the nasal duct. The eyeball lies within the orbital fat and is about one inch in diameter in the transverse plane, somewhat less in the sagittal plane. It is spherical in shape, but the anterior one sixth of the surface is interrupted by a segment of a smaller sphere introduced to form the clear cornea, projecting somewhat beyond the circumference of the posterior larger sphere, the latter being bounded by the tough opaque, and fibrous sclerotic. Entering the eyeball posteriorly is the optic nerve, and rotating it freely upon its cushion of fat are the six ocular muscles, four recti and two oblique. On penetrating the cornea, a clear aqueous humor gushes from that part of the eyeball in front of the crystalline lens. This space is partially divided into a large anterior and a small posterior chamber by the iris; the pupil, or circular opening in the iris, allowing the aqueous humor to circulate in both chambers. The iris is that membrane which gives the eye its color and is composed of circular and radiating muscular (unstriped) fibers, bounding the pupil and inserted circumferentially into the junction of cornea and sclerotic. The choroid is of a deep brownish color, contains many pigment cells, and furnishes the blood-

vessels supplying the eyeball. Hung behind the iris, by means of a suspensory ligament attaching to the ciliary processes, is the crystalline lens enclosed in a transparent capsule. The lens is biconvex, one third of an inch in diameter, one fifth of an inch thick anteroposteriorly, and is composed of concentric and hard but transparent laminæ. With its susfrom the vitreous humor. The vitreous humor is a clear, gelatinous fluid filling the larger sphere of the eyeball, and is contained in a thin, transparent, hyaloid membrane by which it is separated from the retina. The retina is the expanded and differentiated termination of the optic nerve, and lies between the choroid and vitreous. It is very scantily pigmented, but at certain thin points, the dark choroid may be seen behind it. Posteriorly, the optic nerve enters it, and anteriorly it terminates at the outer edge of the ciliary processes. At the point of entrance of the optio nerve there are no terminal elements, hence the "blind spot." The retina presents a yel-low spot a little external to the entrance of the nerve, at which point vision is held to be most acute. The intimate nervous structure of the retina is made of a series of terminal fibers called rods and cones, arranged in ten layers, in which are also found pigment cells and limiting membranes. The rods and cones lie in a radial direction, and it is a curious fact that their terminal elements are found in contact, not with the vitreous humor, but with the choroid, and are turned away from the point of most immediate contact with the impinging visual ray.

The Ear is divided into external, middle, and internal ear. The external ear is composed of the convoluted portion seen externally, and the external auditory canal, terminating at a depth of one and a quarter inches in the drum membrane. The middle ear, or tympanum, is a cavity in the petrous part of the temporal bone about one sixth of an inch wide, containing the ear bones; it is closed externally by the drum membrane, internally by the wall of the internal ear, and opens by a Eustachian tube passing downward, forward, and inward for one-and-a-half inches into the naso-pharnyx. The tympanum is filled with air, and by means of a chain of three small bones, called malleus, incus, and stapes, articulating with one another and connecting the drum membrane with the internal ear, sound waves are transmitted from the outer world to the end filaments of the auditory nerve. Opening posteriorly into the middle ear and serving probably as a sounding board, are the mastoid cells contained within the mastoid portion of the temporal bone. Discharges retained in the middle ear by closure of the Eustachian tube cause abcesses, which, through lack of opportunity to discharge, often spread to the mastoid cells and cause the well-known mastoid abcesses. These latter are occasionally fatal, because the cells are sepa-rated by but a thin layer of bone from the brain. The essential part of the organ of

#### Anaxagoras

hearing, and the only portion existing in many lower animals, is the internal ear or labyrinth. This is made up of a series of cavities lying within the petrous part of the temporal bone and called the bony labyrinth. Within this bony shell is contained the auditory nerve distributed on the membranous labyrinth, and bathed in the clear endolymph filling the cavity of the labyrinth. The bony labyrinth consists of a vestibule opening into the tympanum by a fenestra ovalis, which is closed by a part of the stapes (ossicle). Piercing the inner wall of the vestibule from the internal auditory meatus are several small openings for the fibers of the auditory nerve; in the anterior wall is an opening into the cochlea; and in the posterior wall are the five openings of the semicircular canals. The semicircular canals are three in number (superior, posterior, and external), lying in transverse, sagittal, and hori-zontal planes. They contain a part of the membranous labyrinth, within which are found a few small grains of chalky material (otoliths) moving in the endolymph. The cochlea resembles a small shell, and is a canal coiled spirally two-and-a-half times around a columella or central piece; the canal is divided into two compartments. partly by a bony shelf and by a membrane. The semicircular canals contain that portion of the auditory organ devoted to equilibration, the organ of Corti probably presides over sensations more strictly produced by sounds.

The Tongue or organ of taste is supplied with special sense through branches of the glossopharyngeal nerve distributed to the base of that organ. The so-called gustatory or lingual branch of the fifth nerve is distributed to the anterior two thirds of the tongue, and is said to be merely a nerve of common sensation. Located upon the dorsum or upper surface are numerous elevations or papillæ, arranged in rows running from the median line obliquely outward and forward. The largest of these, lying most posteriorly, and eight or ten in number, contain the taste buds or terminal modifications of the ninth nerve. . Farther forward are more numerous and smaller fungiform papillæ, and scattered in among these are the conical (or smallest) papillæ. Mucous and serous glands furnish the moisture necessary to bring food substance in contact with the taste buds.

The organs of touch will be described with the skin. See *Histology*.

For minute or textural anatomy, see *His*-tology.

For developmental anatomy, see Embryology.

Anaxag oras (500-428 B. C.), an ancient Greek philosopher of the Ionic school, born at Clazomenæ, in Ionia, gathered around him a circle of renowned pupils, including Pericles, Euripides, Socrates, etc. At the age of fifty he was publicly charged with impiety and sentenced to perpetual banishment. He went to Sampsacus, where he died. He held that there was an infinite number of different kinds of elementary atoms, and that these, in themselves motionless and originally existing in a state of chaos, were put in motion by an internal, immaterial, spiritual, elementary being, *Nous* (Intelligence), from which motion the world was produced. The stars were, according to him, of earthy materials; the sun a glowing mass, about as large as the Peloponnesus; the earth was flat; the moon a dark, inhabitable body, receiving its light from the sun, the comets wandering stars. **Anaximan' der** (611-547 B. C.), an ancient

Anaximan' der (611-547 B. C.), an ancient Greek (Ionic) philosopher, was born at Miletus. The fundamental principle of his philosophy is that the source of all things is an undefined substance infinite in quantity. The firmament is composed of heat and cold, the stars of air and fire. The sun occupies the highest place in the heavens, has a circumference twenty-eight times larger than the earth, and resembles a cylinder, from which streams of fire issue. The moon is likewise a cylinder, nineteen times larger than the earth. The earth has the shape of a cylinder, and is placed in the midst of the universe, where it remains suspended. To him is credited the invention of geographical maps and the first application of the style fixed on a horizontal plane to determine the solstices and equinoxes.

Anaximines (an-aks-im'e-nēz) of Miletus, an ancient Greek philosopher, according to whom air was the first principle of all things. Finite things were formed from the infinite air by compression and rarefaction produced by eternally existent motion; and heat and cold resulted from varying degrees of density of the primal element. He flourished about 550 B. C.

Ancachs (ån-kåch'), a dep. of Peru, between the Andes and the Pacific. Area 18,000 sq. mi; pop. 284,000.

Anchises (an-k1'sēz), the father of the Trojan hero Æneas, who carried him off on his shoulders at the burning of Troy and made him the companion of his voyage to Italy. He died during the voyage at Drepanum, in Sicily.

Anchor, in Navigation, a crook or hook, an instrument of iron or other heavy material used for holding ships in any situation in which they may be required to lie, and preventing them from drifting by the winds or tides, by the currents of rivers, or any other cause. This is done by the anchor, after it is let down from the ship by means of the cable, fixing itself into the ground, and there hold-ing the vessel fast. The anchor is thus obviously an implement of the first importance in navigation, and one on which too much attention cannot be bestowed in its manufacture and proper construction, seeing that on it depends the safety of the vessel in storms. The invention of so necessary an instrument is to be referred, as may be supposed, to the remotest antiquity. The most ancient an-chors consisted merely of large stones, baskets full of stones, sacks filled with sand, or logs of wood loaded with lead.

Up to the commencement of the present century what was termed the "old-plan longshanked" anchor seems to have been generally used. It was made of wrought iron, but the appliances of the anchor smith were so crude that little dependence could be placed upon it.

The size of anchors for various ships has been determined by practise, but is based upon the theory that as the anchor is required to withstand the force brought upon the ship by the wind and tide, which would otherwise cause her to drift, its strength must be nearly proportional to her resistance.

A large ironclad carries 8 anchors -2 bow, 2 sheet, 1 stream, 1 stern, and 2 kedge.

Mooring anchors are those which are placed in harbors, etc., for the convenience of vessels frequenting them. A large buoy is attached to the end of the mooring cable, and the ship is made fast to a ring-bolt fitted on the buoy. Mooring anchors are not limited by considerations of weight, etc., as other anchors are, the only requirements being that they have sufficient holding power, and do not project above the ground, as any projection in the shallow waters in which they are usually placed would render ships liable to injury from grounding on them, and be dangerous to fishing-nets, etc.

Anchovy (an-chô'vi), a small fish of the Herring family, all the species, with exception of the common anchovy, inhabitants of the tropical seas of India and America. The common



anchovy, so esteemed for its rich and peculiar flavor, is not larger than the middle finger. It is caught in vast numbers in the Mediterranean, and frequently on the coasts of France, Holland, and the south of England, and pickled for exportation.

Ancho' vy-pear, a tree of the natural order Myrtaceæ, a native of Jamaica, growing to the height of 50 feet, with large leaves and large white flowers, and bearing a fruit somewhat bigger than a hen's egg, which is pickled and eaten like the mango, which it strongly resembles in taste.

Anco'na, a seaport of Italy, capital of the province of the same name, 130 mi. n. e. of Rome, with harbor works begun by Trajan, who built the ancient mole or quay. A triumphal arch of white marble, erected in honor of Trajan, stands on the mole. Ancona is a station of the Italian fleet, and the commerce is increasing. There is a colossal statue of Count Cavour. Ancona is said to have been founded about four centuries B. C., by Syracusan refugees. It fell into the hands of the Romans in the first half of the third century B. C., and became a Roman colony. Pop. 31,277. The province has an area of 740 sq. mi., and a population of 277,861.

Andalu'sia, a large and fertile district in the south of Spain; area about 33,650 sq. mi., including the modern provinces of Seville, Huelva, Cadiz, Jaen, Cordova, Granada, Almeria, and Malaga. It is traversed by mountains, the loftiest being the Sierra Nevada. Minerals abound, especially in the province of Huelva, where the Tharsis and Rio Tinto copper-mines are situated. The principal river is the Guadalquivir. The vine, myrtle, olive, palm, banana, carob, etc., grow abundantly in the valley of the Guadalquivir. Wheat, maize, barley, and many varieties of fruit grow almost spontaneously; besides which, honey, silk, and cochineal form important articles of culture. The horses and mules are the best in the Peninsula; the bulls are sought for bullfighting over all Spain; sheep are reared in vast numbers. Agriculture is in a backward state, and the manufactures are by no means extensive. The Andalusians are descended in part from the Moors, of whom they still preserve decided characteristics. Pop. 3,282,448.

An'damans, a chain of islands on the east side of the Bay of Bengal. The inhabitants are about 14,500 in number, and mostly in a very savage state, living almost naked in the rudest habitations. They are small (generally much less than five feet), well formed, and active, skilful archers and canoeists, and excellent swimmers and divers. These islands have been used since 1858 as a penal settlement by the Indian government, the settlement being at Port Blair, on South Andaman.

An' dersen, HANS CHRISTIAN (1805-1875), a famous Danish novelist, poet, and writer of fairy tales, was born at Odense. Picking up what education he could at leisure he wrote several tragedies, and in 1810 went to Copenhagen, but failed in getting any of his plays accepted. His abilities at last brought him under the notice of Councillor Collin, a man of considerable influence, who procured for him free entrance into a government school at Slagelse. From this school he was transferred to the university, and soon became favorably known by his poetic works. He received a royal grant to enable him to travel, and in 1833 he visited Italy, his impressions of which he pub-lished in *The Improvisatore*. The scene of his following novel, O. T., was laid in Den-mark, and in Only a Fiddler he described his own early struggles. In 1835 appeared the first volume of his Fairy Tales. Among his other works are, Picture-books Without Pictures, A Poet's Bazaar, and a number of dramas. In 1845 he received an annuity from the gov-ernment. He visited England in 1848, and acquired such a command of the language that his next work, The Two Baronesses, was

#### Anderson

written in English. In 1853 he published an autobiography, under the title My Life's Romance, an English translation of which, published in 1871, contained additional chapters by the author, bringing the narrative to 1867. Among his later works we may mention. To Be or Not To Be; Tules from Jutland; The Ice Muiden.

Anderson, Madison co., Ind., on White River. Railroads: Big 4 (C. C. C. & St. L.); Pan Handle (P. C. C. & St. L.); Midland (C. S. & E.). Industries: wire nail works, three flouring mills, four iron foundries, and other factories. Surrounding country agricultural. Oil and gas in abundance. The town was first settled in 1825 and became a city in 1864. Pop. est. 1807, 22, 186.

city in 1864. Pop. est. 1807, 22, 186. Anderson, GALUSHA, b. 1832 in Bergen, N. Y.; educated for the Baptist ministry, held pastorates in Brooklyn and Chicago, and from 1878 to 1885 was president of the old Chicago University. He is now professor in the Divinity school of the new University of Chicago.

Anderson, JOHN (1726-1796), professor of natural philosophy in the University of Glas-gow, Scotland. By his will be directed that the whole of his effects should be devoted to the establishment of Anderson's University. There were to be four colleges-arts, medicine, law, and theology-besides an initiatory school. As the funds, however, were totally inadequate to the plan, it was at first commenced with only a single course of lectures on natural philosophy and chemistry. The institution gradually enlarged its sphere of instruction, the medical school in particular possessing a high reputation. Latterly it has been incorporated with other institutions to form the Glasgow and West of Scotland Technical College, the medical school, however, retaining a distinct position.

Anderson, MARY, a very beautiful and exemplary American actress; born in California in 1859. Her principal successes were in Shakesperian rôles. She married Antonio F. de Navarro in 1890, and retiring absolutely from the stage, published some interesting memoirs.

Anderson, ROBERT (1805-1871), an American soldier, born in Kentucky. He served in the Black Hawk, Florida, and Mexican wars and was wounded at Molino del Rey. As Major of Artillery he was in charge of Forts Moultrie and Sumter in Charleston Harbor on the outbreak of the Civil War in 1861 and gallantly defended Sumter. He was promoted major-general, and died in France.

Andersonville, Sumter co., Ga., the site of a Confederate prison wherein 12,926 Union soldiers died out of 49,485 confined. Henry Wirz, its superintendent, was convicted by a military commission on a charge of cruelty to prisoners, and hanged Nov. 1, 1865. The site is now a National cemetery, wherein 13,-705 soldiers are buried.

Andes (an'dēz), or, as they are called in Spanish South America, Cordilleras (ridges) de los Andes, or simply Cordilleras, a range of mountains stretching along the whole of the west coast of South America, from Cape Horn to the Isthmus of Panama and the Caribbean Sea. In absolute length (4,500 miles) no single chain of mountains approaches the Andes, and only a certain number of the higher peaks of the Himalayan chain rise higher above the sea level; which peak is highest of all is not yet settled. Several main sections of this huge chain are distinguishable. The Southern Andes present a lofty main chain, with a minor chain running parallel to it on the east, from Terra del Fuego and the Straits of Magellan, rising in Aconcagua to a height of 22,860 feet. North of this is the double chain of the central Andes, inclosing the wide and lofty plateaus of Bolivia and Peru, which lie at an elevation of more than 12,000 feet above the sea. The mountain system is here at its broadest, being about 500 miles across. Here are also several very lofty peaks, as Illampu or Sorata (21,484 feet), Sahama (21,054), Illimani (21,024). Farther north the outer and inner ranges draw closer together, and in Ecuador there is but a single system of elevated masses, generally described as forming two parallel chains. In this section are crowded together a number of lofty peaks, most of them volcanoes, either extinct or active. Of the latter class are Pichincha (15,918 feet), with a crater 2,500 feet deep; Tunguragua (16,685 feet); Sangay (17,460 feet); Cotopaxi (19,550 feet). The loftiest summit here appears to be Chimborazo (20,581 feet); others are Antisana (19,260 feet) and Cayambe (19,200 feet). Northward of this section the Andes break into three distinct ranges, the eastmost running northeastward into Venezuela, the westmost running northwestward to the Isthmusof Panama. In the central range is the volcano of Tolima (17,-660 feet). The western slope of the Andes is generally exceedingly steep, the eastern much less so, the mountains sinking gradually to the plains. The whole range gives evidence of volcanic action, but it consists almost entirely of sedimentary rocks. Thus mountains may of sedimentary rocks. Thus mountains may be found rising to the height of over 20,000 feet, and fossiliferous to their summits (as Illimani, and Sorata or Illampu). There are about thirty volcanoes in a state of activity. The loftiest of these burning mountains seems to be Gualaterri, in Peru (21,960 feet). The The heights of the others vary from 13,000 to 20,-000 feet. All the districts of the Andes system have suffered severely from earthquakes, towns having been either destroyed or greatly injured by these visitations. Peaks crowned with perpetual snow are seen all along the range, and glaciers are also met with, more especially from Aconcagua southward. The passes are gen-erally at a great height, the most important being from 10,000 to 15,000 feet. Railways have been constructed to cross the chain at a similar elevation. The Andes are extremely rich in the precious metals, gold, silver, copper, platinum, mercury, and tin, all being wrought; lead and iron are also found. In the Andes are towns at a greater elevation than anywhere else in the world, the highest being

#### Andorre

the silver mining town of Cerro de Pasco (14,-270 feet), the next being Potosi.

Andorre' (or Andor'ra), a small, nominally independent state in the Pyrenees, with an area of about 230 sq. mi.; pop. 10,000. It has been a separate state for six hundred years; is governed by its own civil and criminal codes, and has its own courts of justice, the laws being administered by two judges, one of whom is chosen by France, the other by the Bishop of Urgel, in Spain. The chief industry is the rearing of sheep and cattle. The commerce is largely in importing contraband goods into Spain. Capital, Old Andorré.

Andover, Essex co., Mass., on Shaushin River, 3 mi. e. of Lawrence. Railroad, western division of Boston & Maine. Industries: woolen mills, flax mill, flannel mill, and rubber company. Surrounding country agricultural. Seat of Andover Theological Seminary, Phillips Academy, and Abbot Academy. The town was first settled in 1646. Pop. est. 1897, 6,300.

Ândrassy (an-drä'shē), COUNT JULIUS (1823-1890), Hungarian statesman; took part in the revolution of 1848, was condemned to death, but escaped and went into exile; appointed premier when self-government was restored to Hungary in 1867; became imperial minister for foreign affairs in 1871, retiring from public life in 1879.

André (an'drā), MAJOR JOHN, adjutant-, general in the British army during the American Revolutionary war. Employed to nego-tiate the treason of the American general, Arnold, and the delivery of the works at West Point, he was apprehended in disguise, Sept. 23, 1780, within the American lines; declared a spy from the enemy, and hanged Oct. 2, 1780. His remains were taken to England in 1821 and interred in Westminster Abbey, where a monument has been erected to his memory. Much sympathy was felt for him in the patriot army, but military jurists are agreed that his punishment was merited and necessary. His own letter to Washington was so frank an admission of guilt as to warrant his conviction, and his one chance of escape was destroyed by the British refusal to surrender Arnold. André's personal characteristics made him a universal favorite, and the entire British army wore crape at his loss. His error lay in landing to confer with Arnold, in assuming disguise, and taking a false name in the safe-conduct or pass given him by Arnold.

An drew, ST., brother of St. Peter, and the first disciple whom Christ chose. According to tradition he was crucified at Patræ, now Patras, in Achaia, on a cross of the form  $\times$ . Hence such a cross is now known as a St. Andrew's cross. The Russians revere him as the apostle who brought the gospel to them; the Scots, as the patron saint of their country. The day dedicated to him is November 30. The Russian order of St. Andrew, the highest of the empire, was instituted by Peter the Great in 1698.

An'drews, ELISHA BENJAMIN, D.D., LL.D., born at Hinsdale, N. H., graduated at Brown University, 1870. He taught two years at Suffield, Conn., and was a student at the Theological Institute, 1872-74. He preached one year at Beverly, Mass., and was president of Denison University, Ohio, 1875-79. He studied in Europe, 1882-3, and was professor of public finance at Cornell University, 1888-9. In 1889, he was chosen president of Brown University, which position he still occupies. He was a Union soldier, 1861-64. Among the books of which he is the author, are. Institutes of Economics, Institutes of General History, History of the U. S., and several articles in various magazines.

An drew, JOHN ALBION (1818-1867), born in Albion, Me. He was graduated at Bowdoin, studied law, and was admitted to practise at Boston. He became an antislavery man, and was elected to the Legislature in 1858. In 1860 he was a delegate to the Republican convention which nominated Abraham Lincoln for president, and in the same year was elected governor of Massachusetts. To this office he was re-elected until 1866. In January, 1861, he began to prepare for war by reorganizing the militia. He also called on the governors of the other New England states to do like-wise. Within a week after the president's proclamation of 1861, he dispatched five regiments of infantry, a battalion of riflemen, and a battery of artillery to Washington. In September, 1862, he attended the convention of the governors of the loyal states at Altoona, Pa., and drew up the address they presented to the president.

An'drews, LANCELOT (1555-1626), bishop of the English Church; high in favor both with Queen Elizabeth and James I. In 1605 he became bishop of Chichester, in 1609 was transferred to Ely, and appointed one of the king's privy-councilors; and in 1618 he was transferred to Winchester. He was one of those engaged in preparing the Authorized Version of the Scriptures. He left sermons, lectures, and other writings.

An' drews, ST., an ancient city in Fifeshire, Scotland, 31 mi. n.e. from Edinburgh; was erected into a royal burgh by David I in 1140, and after having been an episcopal, became an archiepiscopal see in 1472, and was for long the ecclesiastical capital of Scotland. The cathedral, now in ruins, was begun about 1160, and took 157 years to finish. The old castle, founded about 1200, and rebuilt in the fourteenth century, is also an almost shapeless ruin. In it James III was born and Cardinal Beaton assassinated, and in front of it George Wishart was burned. There are several other interesting ruins. The trade and manufactures are of no importance, but the town is in favor as a watering-place. Golf is much played here. Pop. 7,000. THE UNI-VERSITY OF ST. ANDREWS, the oldest of the Scotch universities, founded in 1411, consists of three colleges, St. Salvator, St. Leonard's, and St. Mary's. Originally all three had teachers both in arts and theology; but in 1579 the colleges of St. Salvator and St. Leonard were confined to the teaching of arts

and medicine, and that of St. Mary to theology. In 1747 the two former colleges were united by act of Parliament. Degrees are conferred in arts, divinity, medicine, and law; but there is a complete teaching staff only in arts and divinity.

Andrews, STEPHEN PEARL (1812-1886), author, b. in Templeton, Mass. He studied at Amherst College, removed to New Orleans, La., became a lawyer, and in 1839 went to Texas. In 1843 Andrews went to England to raise money with which to purchase the freedom of the Texan slaves, and render it a free state. He was unsuccessful, and returned home, settling in Boston, where he became a leader in the antislavery movement. In 1847 he removed to New York City, where he published a series of phonographic instruction books. He was an accomplished linguist. He also evolved a scientific universal language called "Alwato;" in this he conversed and corresponded with his pupils, and was preparing a dictionary of it at the time of his death.

An'dria, a town of south Italy, province of Bari, with a fine cathedral, founded in 1046; the church of Sant' Agostino, with a beautiful pointed Gothic portal; a college; manufactures of majolica, and a good trade. Pop. 37,-192.

Andromache (an-drom'a-kē), in Greek mythology, wife of Hector, one of the most attractive female characters of Homer's lliad. The passage describing her parting with Hector when he was setting out to his last battle, is well known and much admired. Euripides and Racine have made her the chief character of tragedies.

Androm'eda, in Greek mythology, daughter of the Ethiopian king Cepheus and of Cassiopeia. Cassiopeia having boasted that her daughter surpassed the Nereids, if not Hēra (Juno) herself, in beauty, the offended goddesses prevailed on their father, Poseidön (Neptune), to afflict the country with a horrid sea-monster, which threatened universal destruction. To appease the offended god, Andromeda was chained to a rock, but was rescued by Perseus; and after death, was changed into a constellation.

Androni'cus, the name of four emperors of Constantinople. ANDRONICUS I, Comnenus, b. 1110, murdered 1185. ANDRONICUS II, Palæologus, b. 1258, d. 1332. His reign is celebrated for the invasion of the Turks. An-DRONICUS III, Palæologus the Younger, b. 1296, d. 1341. ANDRONICUS IV, Palæologus, reigned in the absence of John IV. In 1373 he gave way to his brother Manuel, and d. a monk.

Androni' cus of Rhodes, a Peripatetic philosopher who lived at Rome in the time of Cicero. He arranged Aristotle's works in much the same form as they retain in present editions.

Androni'cus, LIVIUS, the most ancient of the Latin dramatic poets; flourished about 240 B. C.; by origin a Greek, and long a slave. A few fragments of his works have come down to us.

#### Anemoscope

Androni'cus Cyrrhestes (sir-es'tēz), a Greek architect about 100 B. C., who constructed at Athens the Tower of the Winds, an octagonal building, still standing. On the top was a Triton, which indicated the direction of the wind. Each of the sides had a sort of dial, and the building formerly contained a clepsydra or water-clock.

Andros, SIR EDMUND (1637-1714), an English colonial governor. Governor of New York in 1674; of New England 1686, of Virginia 1692. He died in England. His conduct in New England was tyrannical and his taxation of the colonists extremely unpopular. His expedition to Hartford gave rise to the Charter Oak incident.

Andros Islands, a group of isles belonging to the Bahamas, lying southwest of New Providence, not far from the east entrance to the Gulf of Florida. The passages through them are dangerous.

Andujar  $(\sin -d\ddot{o} - \hbar\ddot{a}r')$ , a town in Spain, in Andalusia, 50 mi. e. n. e. of Cordova, manufactures a peculiar kind of porous earthen water bottles and jugs. Pop. 12,605.

water bottles and jugs. Pop. 12,605. Anega'da, a British West Indian island, the most northern of the Virgin group, 10 mi. long by 44 broad; contains numerous salt ponds, from which quantities of salt are obtained.

Anemom'eter, an instrument for measuring the force and velocity of the wind. This force is usually measured by the pressure of the wind upon a square plate attached to one end of a spiral spring (with its axis horizontal), which yields more or less according to the force of the wind, and transmits its motion to a pencil which leaves a trace upon paper moved by clockwork. For indicating the velocity of the wind, the instrument which has yielded the best results consists of four hemispherical cups, attached to the ends of equal horizontal arms, forming a horizontal cross which turns freely about a vertical axis. By means of an endless screw, carried by the axis, a train of wheel-work is set in motion; and the indication is given by a hand which moves round a dial; or in some instruments by several hands moving round different dials like those of a gas-meter. It is found that the center of each cup moves with a velocity which is almost exactly one third of that of the wind. There are various other forms of instruments, one of which is portable, and is especially intended for measuring the velocity of currents of air passing through mines, and the ventilating spaces of hospitals and other public buildings. The direction of the wind as indicated by a vane can also be made to leave a continuous record by various contrivances; one of the most common being a pinion carried by the shaft of a vane, and driving a rack which carries a pencil.

Anem'oscope, any contrivance indicating the direction of the wind; generally applied to a vane which turns a spindle descending through the roof to a chamber, where, by means of a compass-card and index, the direction of the wind is shown.

## Angel

Angel, one of those spiritual intelligences who are regarded as dwelling in heaven and employed as the ministers or agents of God. Scripture frequently speaks of angels, but with great reserve, Michael and Gabriel alone being mentioned by name in the canonical books, while Raphael is mentioned in the Apocrypha.

Angel, a gold coin introduced into England in the reign of Edward IV and coined down to the Commonwealth, so named from having



Angel of Edward IV.

the representation of the archangel Michael piercing a dragon upon it. It had different values in different reigns, varying from \$1.75 to \$2.50.

Angel-fish, a fish nearly allied to the sharks, very ugly and voracious, preying on other fish. It is from 6 to 8 feet long, and takes its name from its pectoral fins, which are very large, extending horizontally like wings when spread. This fish connects the rays with the sharks, but it differs from both in having its mouth placed at the extremity of the head.

placed at the extremity of the head. Angelico (an-jel'i-kö), FRA (1387-1455), the common appellation of Fra Giovanni da Fiesole, one of the most celebrated of the early Italian painters. He entered the Dominican order in 1407, and was employed by Cosmo de Medici in painting the monastery of St. Mark and the church of St. Annunziata with frescoes. These pictures gained him so much celebrity that Nicholas V invited him to Rome, to ornament his private chapel in the Vatican, and offered him the archbishopric of Florence, which was declined. His works were considered unrivaled in finish and in sweetness and harmony of color, and were made the models for religious painters of his own and succeeding generations.

Angell, JAMES BURRILL, LL. D., was born in Rhode Island, 1829, graduated at Brown University, 1849, and later became professor of modern languages and literature in the same university. In 1860 he became editor of . the Providence Journal, in 1866 president of the University of Vermont, and in 1871 president of the University of Michigan, where he is at present. He was minister to China in 1880-81, and is a regent of the Smithsonian Institute. He was appointed minister to Turkey by President McKinley in 1897.

**Angelo** (an' je-lo), MICHAEL (Buonarroti) (1475-1563), b. at Caprese, in Tuscany, d. in Rome. He was of the ancient family of the counts of Canossa. He became a distinguished Italian painter, sculptor, architect, and poet. He studied drawing under Domenico Ghirlandaio, and sculpture under Bertoldo

## **Angina Pectoris**

at Florence, and having attracted the notice of Lorenzo de Medici, was for several years an inmate of his household. Having distinguished himself both in sculpture and painting, he was commissioned (together with Leonardo da Vinci) to decorate the senate-hall at Florence with a historical design, but before it was finished, in 1505, he was induced by Pope Julius II to settle in Rome. Here he sculptured the monument of the pontiff (there are seven statues belonging to it) now in the church of St. Pietro in Vincoli; and painted the dome of the Sistine Chapel, his frescoes representing the creation and the principal events of sacred history. In 1530 he took a leading part in the defense of Florence against Charles V. Three years later he began his great picture in the Sistine Chapel, The Last Judgment, which occupied him eight years. His last considerable works in painting were two large pictures: the Conversion of St. Paul, and The Crucifixion of St. Peter, in the Pauline Chapel. In sculpture he executed The Descent of Christ from the Cross, four figures, of one piece of marble. His statue of Bacchus was thought by Raphael to possess equal perfection with the masterpieces of Phidias and Praxiteles. As late as 1546 he was obliged to undertake the continuation of the building of St. Peter's, and planned and built the dome, but he did not live long enough to see his plan finished, in which many alterations were made after his death. Besides this, he undertook the building of the Piazza del Campidoglio (Capitol) of the Farnese Palace, and of many other edifices. His style in architecture is distinguished by grandeur and boidness, and in his ornaments the untamed character of his imagination frequently appears, preferring the uncommon to the simple and elegant. His poems, which he considered merely as pastimes, contain, likewise, convincing proofs of his great genius. His prose works consist of lectures, speeches, etc.

Angers (an-zha), a town and river port of France, capital of the department of Maine-et-Loire, and formerly of the province of Anjou, 54 mi. from the Loire, 150 mi. s. w. of Paris. Has an old castle, once a place of great strength, now used as a prison, barrack, and powder-magazine; a fine cathedral of the twelfth and thirtcenth centuries, with very fine old painted windows, is the seat of a bishop, and has a school of arts and manufactures; a public library, an art-gallery, a large modern hospital, the remains of a hospital founded by Henry II of England in 1155, courts of law, theater, etc. Manufactures: sail-cloth, hosiery, leather, and chemicals. foundries, etc. the neighborhood are immense slate-quarries. Pop. 73,044.

Angina Pectoris (an-jI'na pek'to-ris), or Heart-spasm, a disease characterized by an extremely acute constriction, felt generally in the lower part of the sternum, and extending along the whole side of the chest and into the corresponding arm, a sense of suffocation, faintness, and apprehension of approaching death; seldom experienced by any but those with organic heart-disease. The disease rarely occurs before middle age and is more frequent in men than in women. Those liable to attack must lead a quiet, temperate life, avoiding all scenes which would unduly rouse their emotions. The first attack is occasionally fatal, but usually death occurs as the result of repeated seizures. The paroxysm may be relieved by opiates, or the inhalation, under due precaution, of anæsthetic vapors.

Angler, also from its habits and appearance called *Fishing-frog* and *Sea-devil*, a remarkable fish often found on the British coasts. It is from 3 to 5 feet long; the head is very wide, depressed with protuberances, and bearing long separate movable tendrils; the mouth is



Angler.

capacious. The American Angler, Fishingfrog or Goose-fish, of the Atlantic, is from two to three feet long; it is exceedingly voracious; its large mouth allows it to swallow fish about as big as itself.

Angles, a low German tribe who in the earliest historical period had their seats in the district about Angeln, in the duchy of Sleswig, and who in the fifth century subsequently crossed over to Britain along with bands of Saxons and Jutes (and probably Frisians also), and colonized a great part of what from them has received the name of England, as well as a portion of the Lowlands of Scotland. The Angles formed the largest body among the Germanic settlers in Britain, and founded the three kingdoms of East Anglia, Mercia, and Northumbria.

Anglesey (ang'gl-se) (or Anglesea) ("the Angles' Island"), an island and county of north Wales, separated from the mainland by the Menai Strait. Area 193,511 acres; pop. 50,500. The chief agricultural products are oats and barley, wheat, rye, potatoes, and turnips. Numbers of cattle and sheep are raised. Anglesey yields a little copper, lead, silver, ocher, etc. The Menai Strait is crossed by a magnificent suspension-bridge, 580 feet between the piers and 100 feet above highwater mark, and also by the great Britannia Tubular Railway Bridge. The chief market towns are Beaumaris, Holyhead, Llangefni, and Amlwch.

Anglican Church, a term which strictly embraces only the Church of England and the Protestant Episcopal churches in Ireland, Scotland, and the colonies: but is sometimes used to include also the Episcopal churches of the U. S. The doctrines of the Anglican Church are laid down in the Thirty-nine Articles, and its ritual is contained in the Book of Common Prayer. Within the body there is room for considerable latitude of belief and doctrine, and three sections are sometimes spoken of by the names of the High Church, Low Church, and Broad Church.

Angling, the art of catching fish with a hook, or *angle* baited with worms, small fish, flies, etc. We find occasional allusions to this pursuit among the Greek and Latin classical writers. It is mentioned several times in the Old Testament, and it was practised by the ancient Egyptians. The old-est work on the subject in English is the *Treatyse of Fysshinge with an Angle*, printed by Wynkyn de Worde, in 1496, along with treatises on hunting and hawking, the whole being ascribed to Dame Juliana Berners, or Barnes, prioress of a nunnery near St. Al-bans, England. Walton's inimitable disbans, England. Walton's inimitable dis-course on angling was first printed in 1653. The chief appliances required by an angler are a rod, line, hooks, and baits. Rods are made of various materials, and of various sizes. The cane rods are lightest; and where fishing-tackle is sold they most commonly have the preference; but in country places the rod is often of the angler's own manufacture. Rods are commonly made in sepa-rate joints so as to be easily taken to pieces and put up again. They are made to taper from the butt end to the top, and are usually possessed of a considerable amount of elasticity. In length they may vary from ten feet to more than double, with a corresponding difference in strength -a rod for salmon being necessarily much stronger than one suited for ordinary brook trout. The *reel*, an apparatus for winding up the line, is attached to the rod near the lower end, where the hand grasps it while fishing. The best are usually made of brass, are of simple construction, and are so made as to wind or unwind freely and rapidly. That part of the line which passes along the rod and is wound on the reel is called the reel line, and may vary from 20 to 100 yards in length, according to the size of the water and the habits of the fish angled for; it is usually made of twisted horsehair and silk, or of oiled silk alone. The casting line, which is attached to this, is made of the same materials but lighter and finer. To the end of this is tied a piece of fine gut, on which the hook or hooks are fixed. The which the hook or hooks are fixed. The casting or gut lines should decrease in thickness from the reel line to the hooks. The hook of finely tempered steel should readily bend without breaking, and yet retain a sharp point. It should be long in

# Anglo-Saxons

the shank and deep in the bend; the point straight and true to the level of the shank; and the barb long. Their sizes and sorts must of course entirely depend on the kind of fish that are angled for. Floats formed of cork, goose and swan quills, etc., are often used to buoy up the hook so that it may float clear of the bottom. For heavy fish or strong streams a cork float is used; in slow water and for lighter fish, quill floats. Baits may consist of a great variety of materials, natural or artificial. The principal natural baits are worms: common garden worms, brandlings, and red worms, maggots, or gentles (the larvæ of blow-flies such as fish (as minnows), salmon roe, etc. The ar-tificial flies so much used in angling for trout and salmon are composed of hairs, furs, and wools of every variety, mingled with pieces of feathers and secured together by plaited wire, or gold and silver thread, marking silk, wax, etc. The wings may be made of the feathers of domestic fowls, or any others of a showy color. Some angling authorities recommend that the arti-ficial flies should be made to resemble as closely as possible the insects on which the fish is wont to feed, but experience has shown that the most capricious and unnatural combinations of feather, fur, etc., have been often successful where the most artistic imitations have failed. Artificial minnows, or other small fish, are also used by way of bait, and are so contrived as to spin rapidly when drawn through the water in order to attract the notice of the fish angled for. Angling, especially with the fly, demands a great deal of skill and practise, the throwing of the line properly being the initial difficulty. Nowhere is the art pursued with greater success and enthusiasm than in the U. B.

Anglo-Saxons, the name commonly given to the nation or people formed by the amalgamation of the Angles, Saxons, and Jutes, who settled in Britain in the fifth and sixth centuries after Christ, the Anglo-Saxons being simply the English people of the earlier period of English history. The tribes who were thus the ancestors of the bulk of the Englishspeaking nationalities came from north Germany where they inhabited the parts about the mouths of the Elbe and Weser, and the first body of them who gained a footing in Britain are said to have landed in 449, and to have been led by Hengist and Horsa. From the preponderance of the Angles the whole country came to be called *Engla-land*; that is, the land of the Angles or English. Modern officials such as sheriffs and aldermen and at least one rank of nobility, that of earl, owe their origin to Anglo-Saxon institutions.

Ango'la, a Portuguese territory in Western Africa, s. of the Congo; area 300,000 sq. mi.; pop. 2,000,000; sometimes in the northern part of it, also known as Loanda. The principal town is the seaport of St. Paul de Loanda, which was long the great Portuguese slave-mart.

Exports: ivory, palm oil, coffee, hides, gum, wax, etc. Pop. 600,000.

Ango ra, a town in the interior of Asiatic Turkey, 215 mi. e.s.e. of Constantinople, with considerable remains of Byzantine architecture, and relics of earlier times, both Greek and Roman, such as the remnants of the Monumentum Ancyranum, raised in honor of the Emperor Augustus. All the animals of this region are long haired, especially the goats (see Goat), sheep, and cats. This hair forms an important export, as well as the fabric called camlet here manufactured from it, other exports being goats' skins, dye-stuffs, gums, honey, and wax, etc. Est. pop. 35,000.

Angostu'ra (or Ciudad Bolivar), a city of Venezuela, capital of the province of Bolivar, on the Orinoco, about 240 mi. from the sea. Exports: gold, cotton, indigo, tobacco, coffee, cattle, etc.; imports: manufactured goods, wines, flour, etc. Pop. 10,861. Angostura Bark, the aromatic bitter medic-

Angostura Bark, the aromatic bitter medicinal bark obtained chiefly from a tree of 10 to 20 feet high, growing in the northern regions of South America. The bark is valuable as a tonic and febrifuge, and is also used for a kind of bitters. From this bark being adulterated, indeed sometimes entirely replaced, its use as a medicine has been almost given up.

Angoulême (ån-gö-lām), an ancient town of western France, capital of dep. Charente, 60 mi. n.n.e. of Bordeaux. It has a fine old cathedral, a beautiful modern town-hall, a lyceum, public library, natural history museum, hospital, lunatic asylum, etc. There are manufactures of paper, woolens, linens, distilleries, sugar-works, tanneries, etc. Pop. 34,647.

Angra (an' gra), a seaport of Terceira, one of the Azores, with the only convenient harbor in the whole group. It has a cathedral, a military college, and arsenal, etc., and is the residence of the governor-general of the Azores and of the foreign consuls. Pop. 11,281.

Angra Pequena ("little bay"), a bay on the west of Namaqualand, S. Africa, where the German commercial firm Lüderitz in 1883 acquired a strip of territory and established a trading station. In 1884, notwithstanding some weak protests of the British, Germany took under her protection the coast territory around this port, and soon after extended the protectorate to the Portuguese frontier, but not including the British settlement of Walfisch Bay.

Anguilla (ang-gil'a) (or Snake Island), one of the British West India Islands, 60 mi. n. e. of St. Kitts. Area 35 sq. mi. A little sugar, cotton, tobacco, and maize are grown. There is a saline lake in the center which yields a large quantity of salt. Pop. 2,773, of which 100 is white.

An'halt, a duchy of north Germany, area 906 sq. mi. All sorts of grain, wheat especially, are grown in abundance: also flax, rape, potatoes, tobacco, hops, and fruit. Excellent cattle are bred. The inhabitants are principally occupied in agriculture, though there are some iron works and manufactures of woolens, linens, beet-sugar, tobacco, etc. The united principality is now incorporated in the German Empire, and has one vote in the Bundesrath and two in the Reichstag. Pop. 232,592, almost all Protestants. The chief towns are Dessau, Bernburg, Köthen, and Zerbst.

Anhy' drite, anhydrous sulphate of calcium, a mineral presenting several varieties of structure and color. The *vulpinite* of Italy possesses a granular structure, resembling a coarsegrained marble, and is used in sculpture. Its color is grayish white, intermingled with blue.

An' iline, a substance which has become of great importance, as being the basis of a number of brilliant and durable dyes. It is found in small quantities in coal-tar, but the aniline of commerce is obtained from benzine or benzole, a constituent of coal-tar, consisting of hydrogen and carbon. Benzine, when acted on by nitric acid, produces nitro-benzine; and this substance again, when treated with nascent hydrogen, generally produced by the action of acetic acid upon iron-filings or acraps, produces aniline. It is a colorless, oily liquid, somewhat heavier than water, with a peculiar, vinous smell, and a burning taste. Its name is derived from anil, the Portuguese and Spanish name for indigo, from the dry distillation of which substance it was first obtained by the chemist Unverdorben in 1826. When acted on by arsenious acid, bichromate of potassium, stannic chloride, etc., aniline produces a great variety of compounds, many of which are possessed of very beautiful colors, and are known by the names of aniline purple, aniline green, rosëine, violine, bleu de Paris, magenta, etc. The manufacture of these aniline or coal-tar dyes as a branch of industry was introduced in 1856 by Perkin of London. Since then the manufacture has reached large dimensions.

Animal, an organized and sentient living being. Life in the earlier periods of natural history was\_attributed almost exclusively to animals. With the progress of science, however, it was extended to plants. In the case of the higher animals and plants there is no difficulty in assigning the individual to one of the two great kingdoms of organic nature, but in their lowest manifestations, the vegetable and animal kingdoms are brought into such immediate contact that it becomes almost impossible to assign them precise limits, and to say with certainty where the one begins and the other ends. From form no absolute distinction can be fixed between animals and plants. Many animals, such as the sea-shrubs, sea-mats, etc., so resemble plants in external appearance that they were, and even yet popularly are, looked upon as such. With regard to internal structure no line of demarkation can be laid down, all plants and animals being, in this respect, fundamentally similar; that is, alike composed of molecular, cellular, and fibrous tissues. Neither are the chemical characters of animal and vegetable substances more distinct. Animals contain in their tissues and fluids a larger proportion of nitrogen

than plants, while plants are richer in carbonaceous, compounds than the former. In some animals, moreover, substances, almost exclusively confined to plants, are found. Thus the outer wall of Sea-squirts contains cellulose, a substance largely found in plant-tissues; while chlorophyll, the coloring-matter, of plants, occurs in Hydra and many other lower animals. Power of motion, again, though broadly distinctive of animals, cannot be said Thus to be absolutely characteristic of them. many animals, as oysters, sponges, corals, etc.. in their mature condition are rooted or fixed, while the embryos of many plants, together with numerous fully developed forms, are endowed with locomotive power by means of vibratile, hair-like processes called cilia. The distinctive points between animals and plants which are most to be relied on are those derived from the nature and mode of assimilation of the food. Plants feed on inorganic matters. consisting of water, ammonia, carbonic acid. and mineral matters. They can only take in food which is presented to them in a *liquid* or gaseous state. The exceptions to these rules are found chiefly in the case of plants which live parasitically on other plants or on animals. in which cases the plant may be said to feed on organic matters, represented by the juices of their hosts. Animals, on the contrary, require organized matters for food. They feed either upon plants or upon other animals. But even carnivorous animals can be shown to be dependent upon plants for subsistence, since the animals upon which Carnivora prey are in their turn supported by plants. Animals, further, can subsist on solid food in addition to liquids and gases; but many animals (such as the Tapeworms) live by the mere imbibition of fluids which are absorbed by their tissues, such forms possessing no distinct digestive system. Animals require a due supply of *waygen gas* for their sustenance, this gas being used in respiration. Plants, on the contrary, require carbonic acid. The animal exhales or gives out carbonic acid as the part result of its tissue-waste, while the plant taking in this gas is enabled to decompose it into its constituent carbon and oxygen. The plant retains the former for the uses of its economy, and liberates the oxygen, which is thus restored to the atmosphere for the use of the animal. Animals receive the food into the interior of their bodies, and assimilation takes place in their internal surfaces. Plants, on the other hand, receive their food into their external surfaces, and assimilation is effected in the external parts, as is exemplified in the leaf-surfaces, under the influence of sunlight. All animals possess a certain amount of heat or temperature which is necessary for the performance of vital action. The only classes of animals in which a constantly-elevated temperature is kept up are birds and mammals. The bodily heat of the former varies from  $100^{\circ}$  F. to  $112^{\circ}$  F., and of the latter from  $96^{\circ}$  F. to  $104^{\circ}$  F. The mean or average heat of the human body is about  $99^{\circ}$  F., and it never falls much below this in health. Below birds,

## Animal Chemistry

animals are named "cold-blooded;" this term meaning in its strictly physiological sense that their temperature is usually that of the medium in which they live, and that it varies with that of the surrounding medium. "Warmblooded" animals, on the contrary, do not exhibit such variations, but mostly retain their normal temperature in any atmosphere. The cause of the evolution of heat in the animal body is referred to the union (by a process resembling ordinary combustion) of the carbon and hydrogen of the system with the oxygen taken in from the air in the process of respiration.

Animal Chemistry, the department of organic chemistry which investigates the composition of the fluids and the solids of animals, and the chemical action that takes place in animal bodies. There are four elements, sometimes distinctively named organic elements, which are invariably found in living bodies; viz., carbon, hydrogen, oxygen, and nitrogen. To these may be added, as frequent constitu-ents of the human body, sulphur, phosphorus, lime, sodium, potassium, chlorine, and iron. The four organic elements are found in all the fluids and solids of the body. Sulphur occurs in blood and in many of the secretions. Phosphorus is also common, being found in nerves, in the teeth, and in fluids. Chlorine occurs almost universally throughout the body; lime is found in bone, in the teeth, and in the secretions; iron occurs in the blood, in urine, and in bile; and sodium, like chlorine, is of almost universal occurrence. Potassium occurs in muscles, in nerves, and in the blood corpus-Minute quantities of copper, silicon, cles. manganese, lead, and lithium are also found in the human body. The compounds formed in the human organism are divisible into the organic and inorganic. The most frequent of the latter is water, of which two thirds (by weight) of the body is composed. The organic compounds may, like the foods from which they are formed, be divided into the nitrogenous and non-nitrogenous. Of the former the chief are albumen (found in blood, lymph, and chyle), casein (found in milk), myosine (in muscle), gelatine (obtained from bone), and others. The non-nitrogenous compounds are represented by organic acids, such as formic, acetic, butyric, stearic, etc.; by animal starches, sugars; and by fats and oils, as stearine and olein.

Animalcule (an-i-mal'kūl), a general name given to many forms of animal life from their minute size. We thus speak of the Infusoria Animalcules among the Protozoa, of the Rotifera or Wheel Animalcules, etc., but the term is not now used in zoology in any strict significance, nor is it employed in classification.

Animal Intelligence.— In considering the intelligence of animals we must guard against errors resulting from reading human experiences into brute life. It is rather difficult to provide against this common mistake; but it makes results unreliable if we interpret the various expressions of animals in the light of human experiences alone.

#### Animal Intelligence

We gain the best conception of the mentality of animals by studying them from the point of view of the elements of mental life. What elements of consciousness are possessed by this or that animal, and what characteristics are absent that are so essential to human mind? Do all animals possess the same senses - seeing, hearing, smell, taste, temperature, touch. etc. — as do human beings? What can be said of their memory power? Do they form mental images? Have they the powers of judgment and comparison? Do they experience emotions such as anger, grief, joy? Are they able to reason? Let us consider some of these elements of mental life more particularly as being present or absent in the experiences of the lower animals.

SENSE POWERS.— The sense experiences constitute the most important of all the group of facts that go to make up mental life. The senses furnish the raw material for the mind to operate on in its acts of memory, imagination, judgment, comparison, reasoning, and the higher processes. What we remember depends upon what we have received through our senses. What we compare are the data gained from sense experiences of various sorts. We reason about material furnished the mind through the various avenues of sense.

TOUCH.— The various parts of the human body differ in the delicacy of the sense of touch. The red part of the lips, the finger tips, the tip of the tongue have a more delicate sense of touch than any other portion of the human body. The covering or skin of the various animals differs greatly in the delicacy of the tactile sense. In some animals special hairs are very delicate touch-organs, as in the whiskers of the cat and the long hair on the rabbit's lip. With the aid of these the rabbit can readily find the way to the burrow in the densest darkness: clip them off, and the poor animal is unable to find its way in the dark. The wing of the bat is very sensitive to touch. Through that sense alone the bat is able to direct its way while flying rapidly through the darkest caves. Many insects as well as the crustaceans are covered with a tough skin and sometimes with even a dense armor, and many would suppose that such creatures would be deprived of the sense of touch. But even in these animals the sense of touch is by no means absent. Seated on the tough skin are little hairs almost invisible, through the base of which a little delicate nerve passes through a very small perforation in the integument. These are very numerous in the end branches of the legs of many insects. It seems that even the lowest forms of animal life (the primitive amœba, for example) possess the sense of touch in a greater or less degree. And by the way, this is the most important sense of all those

with which even human beings are endowed. TEMPERATURE SENSE.—This is closely associated with the sense of touch. It has been shown by Goldscheider and others that there are on the skin of the human hand, for example, special points that are sensitive to heat and cold. These are called heat and cold spots. Neither the heat nor cold spots are sensitive to pressure, pain, touch, or any other stimulus. They are nervous end-organs set apart for the special service of the temperature sense. They are present in some of the lower animals.

TASTE. — This sense is brought into exercise by fluids coming into contact with special end-organs, like the taste bulbs located in the skin covering the tongue and palate of the human being. What is ordinarily called taste is really taste plus smell. If the nose be stopped so that air cannot pass over the olfactory end-organs, one cannot tell the taste of the scraped apple, pear, banana, peach, or onion from one another. These substances cannot be distinguished from each other by taste alone. Vanilla is almost absolutely tasteless, but is detected in the ice cream by its odor rather than taste. On the other hand quinine is absolutely odorless, but has a marked bitter Tastes are classified into sweet, sour, taste. salt, bitter, and alkaline.

In birds and reptiles the sense of taste is not very well developed. Parrots have the most delicate sense of taste of all the birds. A snake, when partially blind owing to a change of skin, will eat a piece of cloth as readily as a field mouse. In fishes the scales and skin are provided with sense organs that distinguish the taste of liquids. In he codfish these taste bulbs are located along the clearly marked lines on both its sides. Caterpillars refuse to eat certain herbs because of their bitter taste. Moisten the end of the legs (where the taste organs are located) of the cockroach with a bitter solution (quinine) and see how quickly he tries to get rid of it. Butterflies are delighted with sweetened water. Drop a little Epsom Salts into such a solution, and the poor butterfly spits and sputters and hastily leaves off his indulgence. Tempt bees with sugar, and they will rapidly congregate in great glee. Substitute powdered alum for the sugar, and they will become viciously angry. Mix strychnine and honey and offer it to a colony of ants. The smell of the honey will attract them, but when they begin to feed, the effect of the taste at once becomes evident.

SMELL.-In some of the lower animals this sense is exceedingly acute. See how the dog can track its master through the crowded street. Deer are also endowed with an exceedingly keen sense of smell. In birds this sense is but little developed. Even vultures cannot detect the presence of food when it is hidden from their sight. Reptiles likewise are very dull with respect to the sense of smell. Among the fishes the shark has a very keen sense of Deprive it of this sense, and it will smell. refuse to eat or move, but becomes perfectly helpless. The shark is so dependent on the sense of smell that it will starve when unable to exercise this sense, though food be placed immediately in front of it where it can be plainly seen. There is no doubt that insects possess the sense of smell in a marked degree. Dr. McCook introduced a little piece of blotting paper saturated with cologne water into

the neighborhood of a lot of pavement ants who were engaged in a flerce battle. The effect was immediate. They stopped fighting, The letting go of their enemies' legs and bodies at once. In insects the sense of smell is located in the extremity of the legs. Clip these off, and even the carrion fly will fail to discover the putrid flesh, its chosen morsel. Likewise as to the cockroach, bumble-bee, crawfish, and other animals. In the snail the sense of smell is located in the horns. In shell-fish it is found in the little seam of flesh near the parting of the shells. In worms it is located in little pits or depressions. Starfish can scent the oyster, its chosen article of food, at a distance of several hundred yards.

HEARING.— The horse and deer have the keenest sense of hearing. Some animals, such as the dog, will howl with misery when certain notes are struck; e. g., tenor D. Birds also have a very delicate sense of hearing. Note how the thrush listens for worms in the early summer morning. Observe also the astounding accuracy with which some birds imitate the songs of other birds. Fishes are especially dull as to the sense of hearing, though carp in the royal park at Potsdam, in Germany, come to be fed at the sound of a bell. But in this case it is not clearly proven that the person who came to feed them was hidden from sight. Even animals so low in the scale as jelly-fish and medusa have organs of hearing. Shell-fish also hear. In the lobster and crawfish the end-organs of hearing are found at the little ending branches of the leg. This is also the case with most insects. The capricorn beetle will, on hearing a sound, hold its antennules erect while intently listening for further developments. The mosquito hears by means of organs located in its hair-like legs. Some insects, the cricket, for example, can certainly hear sounds pitched higher than the compass of the human ear.

SIGHT.-In many animals the acuteness of vision is remarkable. Dogs can be taught to distinguish between variously colored cards. Insect-eating mammals have a well-developed color-sense. Bulls have a strong color antipathy. Birds have the keenest sense of vision of all the animals. The swift will detect the minute insects that constitute its food as they crawl on the ground below. Even barn-yard fowls will detect with astonishing accuracy the difference between sand grains and crumbs of food. At near distances certain reptiles see with remarkable clearness. The chameleon is a striking example. Also frogs and toads use a keen sense of vision in capturing the insects they eat. Fish seem to be unable to distinguish worms at a greater horizontal distance than four feet. Insects, especially those with compound eyes, can readily distinguish between colors. John Lubbock found that if he brought a bee to some honey on a glass placed on a bit of blue paper, having also placed about three feet away some honey on a bit of glass over yellow paper, no matter how often the papers were changed or where placed, the bee would always come to the bit of honey that

happened to be placed over the bit of blue paper. As Lubbock says, "No one can have the slightest doubt as to the bee accurately perceiving the difference between colors." The water flea always prefers the yellows and greens to the blues and reds. In worms, eyes are sometimes present, but more frequently they are absent. In starfish, eyes frequently occur. In medusa they are found on the margin of the umbrella. In most of them, however, sight means merely the ability to distinguish between light and darkness.

MUSCLE SENSE.—The muscle sense is well developed in most animals. That is also true of the organic sense of hunger and thirst. Some animals also possess the sense of rotation.

MEMORY.-Some persons are naturally slow, others quick, with respect to remembering and recalling past experiences. It does not follow that those who are slow are really inferior in mental power. Sharp, quick, ready boys and girls do not always make strong original thinkers. So some animals may seem to be very slow in exercising their powers of recollection, and yet stand rather high in the scale of intelligence. In the first place it should be noticed that with animals as with men, those ideas that are associated with some strong feeling of pleasure or pain-ideas that are tinged with emotionare those that are best remembered. Observation plainly shows that some animals have remarkably tenacious memories. Even a very young chick once being stung by a hive bee will ever after avoid taking a bee into its bill, in this way manifesting a memory similar to that of a child, who after having been burnt, avoids the fire. Darwin's dog recognized him on his return after a five years' voyage round the world. Some dogs learn rapidly, but soon forget the tricks one has taught them. Circustrained dogs are usually slow in learning, but are more valuable because they retain impressions so tenaciously. Captain Shipp gave an elephant a sandwich of cayenne pepper. He then waited six weeks before again visiting the animal, and when he went into the stable he began to fondle the elephant, as had always Watching his opportunity been his custom. the elephant filled his trunk with water, and seems to be an excellent example of definite memory of a specific occurrence.

**REASONING.**—Do animals reason? In attempting to answer this question we must clearly define what is meant by reasoning. As Morgan says, "If we apply the term 'reasoning' to that process by which an animal, profiting by experience adapts his actions to somewhat differing conditions, there can be no hesitation in saying that animals do reason." We are also warranted in going further. Animals also draw inferences. You may have seen the horse you were driving make a start forward as he hears the whip drawn from the socket; he has an image of the pain caused by the sting of the lash even before feeling it again, and infers that if he does not trot faster he will feel the painful cut of the whip. Is the process going on in the mind of the horse very different from that of the school-boy who hears his teacher take the whip from its resting place over the blackboard? See how quickly he leaves off his misdemeanor, turns round in his seat, sits erect, seemingly focuses his attention on his lesson and looks innocent. I remember, when yet a boy, of strolling one morning along the banks of the White River at Indianapolis. Soon I noticed that a blind horse had wandered into the river, and, getting beyond his depth, was in danger of drowning; for he could not tell in which direction the shore lay. Men planning to save him were seeking for boats and a rope with which to go to his rescue. At this juncture a saddle horse which had been left standing in front of a store near the bank, hearing the piteous sounds of the blind horse, galloped to the water's edge and then swam to the bewildered and struggling animal, taking hold of the mane with his teeth, led the sinking horse to the opposite bank where it was easier to land than at the one whence he had come. This seems to me a mental process very akin to reasoning in man.

The mental states of animals are more naive and not so interrelated and complex as our own, and can therefore be traced to their origin and sources much better and more readily than is possible with our own activities. Mr. Romanes records an interesting observation of which one of his dogs was the subject, and which, since it is typical of its kind, we may here briefly consider. The dog was cowed by the sound of apples being rolled on the floor of the loft above the stable; but when Mr. Romanes took the dog up into the loft and let him see what was going on, he seemed Mr. Romanes enters this under the heading, "Appreciation of cause by the dog." the dog really perceived the relation of causation as such, he had rational grounds for ceasing to be disquieted. Such illustrations as these, despite the severest criticism, seem to show a wonderful intelligence and even reasoning in animals. W. O. KROHN.

Animals, Cruelty to, an offense against which societies have been formed and laws passed in England and other countries. The American society for its prevention owes its existence to the lifelong endeavors of Henry Bergh.

Animal Worship, a practise found to prevail, or to have prevailed, in the most widely distant parts of the world, both the Old and the New, but nowhere to such an amazing extent as in ancient Egypt, notwithstanding its high civilization. Nearly all the more important animals found in the country were regarded as sacred in some part of Egypt, and the degree of reverence paid to them was such that throughout Egypt the killing of a hawk or an ibis, whether voluntary or not, was punished with death. The worship, however, was not, except in a few instances, paid to them as actual deities. The animals were merely regarded as sacred to the deities, and the worship paid to them was symbolical.

8

Anise (an is), an annual plant, a native of the Levant, and cultivated in Spain, France, Italy, Malta, etc., whence the fruit popularly called *aniseed*, is imported. It has an aromatic smell, and is largely employed to flavor liquors (aniseed or anisette), sweetmeats, etc. Staranise is the fruit of an evergreen Asiatic tree, and is brought chiefly from China. An essential oil is obtained from both kinds of anise, and is used in the preparation of cordials, for scenting soaps, etc.

Anjou (an-zhö), an ancient province of France, now forming the department of Maine-et-Loire, and parts of the departments of Indre-et-Loire, Mayenne, and Sarthe. Area about 3,000 sq. mi. In 1060 the province passed into the hands of the house of Gatinais, of which sprang Count Godfrey V who, in 1127, married Matilda, daughter of Henry I of England, and so became the ancestor of the Plantagenet kings. Anjou remained in the possession of the English kings up to 1204, when John lost it to the French king Philip Augustus. In 1226 Louis VIII bestowed this province on his brother Charles; but in 1328 it was remitted to the French crown. John I raised it to the rank of a ducal peerage, and gave it to his son Louis. Henceforth it re-mained separate from the French crown till 1480, when it fell to Louis XI.

Anna Comme'na (1083-1148), daughter of Alexius Comnenus I, Byzantine emperor. After her father's death she endeavored to secure the succession to her husband, Nicephorus Briennius, but was baffled by his want of energy and ambition. She wrote (in Greek) a life of her father Alexius, which, in the midst of much fulsome panegyric, contains some valuable and interesting information. She forms a character in Sir Walter Scott's. Count Robert of Paris.

Anna lvanov'na (1693-1740), empress of Russia; the daughter of Ivan, the elder halfbrother of Peter the Great. She was married in 1710 to the Duke of Courland, in the following year was left a widow, and in 1730 ascended the throne of the czars on the condition proposed by the senate, that she would limit the absolute power of the czars, and do nothing without the advice of the council composed of the leading members of the Russian aristocracy. But no sooner had she ascended the throne than she declared her promise null, and proclaimed herself autocrat of all the Russias. She chose as her favorite Ernest John von Biren (or Biron), who was soon all-powerful in Russia, and ruled with great severity. Several of the leading nobles were executed, and many thousand men exiled to In 1737 Anna forced the Courlanders Siberia. to choose Biren as their duke, and nominated him at her death regent of the empire during the minority of Prince Ivan (of Brunswick).

Annap'olis, capital of Maryland, on the Severn, near its mouth in Chesapeake Bay. It contains a college (St. John's), a state-house, and the U. S. naval academy. Pop. 7,604.

Annap'olis, a small town in Nova Scotia, on an inlet of the Bay of Fundy, with an im-

# Annealing

portant herring-fishery. It is one of the oldest European settlements in America, dating from 1604.

Ann Arbor, Washtenaw co., Mich., on Huron river, 38 mi. w. of Detroit. Railroads: Michigan Central; Ann Arbor Ry. Industries: furniture factory, three flouring mills, two agricultural implement works. Surrounding country agricultural. It is the seat of the University of Michigan. Pop. est. 1897, 13,000.

Annat'to (Arnot'to), an orange-red coloring matter, obtained from the pulp surrounding the seeds of a shrub native to tropical America, and cultivated in Guiana, St. Domingo, and the East Indies. It is sometimes used as a dye for silk and cotton goods though it does not produce a very durable color, but it is much used in medicine for tinging plasters and ointments, and to a considerable extent by farmers for giving a rich cofor to cheese.

Anne (1664-1714), Queen of Great Britain and Ireland, was born at Twickenham, near London. She was the second daughter of James II, then Duke of York, and Anne, his wife, daughter of the Earl of Clarendon. With her father's permission she was educated according to the principles of the English Church. In 1683 she was married to Prince George, brother to King Christian V of Denmark. On the arrival of the Prince of Orange in 1088, Anne wished to remain with her father: but she was prevailed upon by Lord Churchill (afterward Duke of Marlborough) and his wife to join the triumphant party. After the death of William III in 1702 she ascended the English throne. Her character was essentially weak, and she was governed first by Marlborough and his wife, and afterwards by Mrs. Masham. Most of the principal events of her reign are connected with the war of the Spanish Succession. The only important acquisition that England made by it was Gibraltar, which was captured in 1704. Another very important event of this reign was the union of England and Scotland under the name of Great Britain, which was accomplished in 1707. The reign of Anne was distinguished not only by the brilliant successes of the British arms, but also on account of the number of admirable and excellent writers who flourished at this time, among whom were Pope, Swift, and Anne bore her husband many chil-Addison. dren, all of whom died in infancy except one son, the Duke of Gloucester, who died at the age of twelve.

Annealing (an-ēl'ing), a process to which many articles of metal and glass are subjected after making, in order to render them more tenacious, and which consists in heating them and allowing them to cool slowly. When the metals are worked by the hammer, or rolled into plates, or drawn into wire, they acquire a certain amount of brittleness, which destroys their usefulness and has to be remedied by annealing. The tempering of steel is one kind of annealing. Annealing is particularly employed in glass-houses, and consists in putting the gluss vessels, as soon as they are formed and while they are yet hot, into a furnace or ٠,

oven, in which they are suffered to cool gradually. The toughness is greatly increased by cooling the articles in oil.

Annecy (an-sē), an ancient town in France, department of Haute-Savoie, 21 mi. s. of Geneva; manufactures of cotton, leather, paper, and hardware. Pop. 9,144.

Annel'ida, an extensive division or class of articulate animals, so called because their bodies are formed of a great number of small rings. The earth-worm, the lobworm, the nereis, and the leech belong to this division.

Anniston, a thriving town in Calhoun co., Ala., 15 mi. s.w. of Jacksonville. Iron mines and the works of the Woodstock Iron Co. are here. Pop. 9,876.

**Annobon'** (or Annobom), a beautiful Spanish island of western Africa, s. of the Bight of Biafra, about 4 mi. long by 2 mi. broad, and rising abruptly to the height of 3,000 feet, richly covered with vegetation. Pop. 3,000.

richly covered with vegetation. Pop. 3,000. Annonay (ån-o-nä), a town in southern France, department of Ardèche. 37 mi. s.s.w. of Lyons. It is the most important town of Ardèche, manufacturing paper and glove leather to a large extent, also cloth, felt, silk stuffs, gloves, hosiery, etc. There is an obelisk in memory of Joseph Montgolfier of balloon fame, a native of the town. Pop. 14,549.

Annu'ity, a sum of money paid annually to a person and continuing either a certain number of years, or for an uncertain period to be determined by a particular event, as the death of the recipient (or annuitant) or that of the party liable to pay the annuity; or the annu-ity may be perpetual. The payments are made at the end of each year, or semi-annually, or at other periods. An annuity is usually raised by the present payment of a certain sum as a consideration whereby the party making the payment, or some other person named by him, becomes entitled to an annuity, and the rules and principles by which this present value is to be computed have been the subjects of careful investigation. The present value of a perpetual annuity is evidently a sum of money that will yield an interest equal to the annuity, and payable at the same periods; and an annuity of this description, payable quarterly, will evidently be of greater value than one of the same amount payable annually, since the annuitant has the additional advantage of the interest on three of the quarterly payments until the expiration of the year. In other words, it requires a greater present capital to be put at interest to yield a given sum per annum, payable quarterly, than to yield the same annual sum payable at the end of each year. The present value of an annuity for a limited period is a sum which, if put at interest, will at the end of that period give an amount equal to the sum of all the payments of the annuity and interest; and accordingly, if it be proposed to invest a certain sum of money in the purchase of an annuity, for a given number of years, the comparative value of the two may be precisely estimated, the rate of interest being given. But annuities for uncertain periods,

and particularly life annuities, are more frequent, and the value of the annuity is computed according to the probable duration of the life by which it is limited. Such annuities are often created by contract, whereby the government or a private annuity office agrees, for a certain sum advanced by the purchaser, to pay a certain sum in yearly, quarterly, or other periodical payments, to the person advancing the money, or to some other named by him, during the life of the annuitant. Or the annuity may be granted to the annuitant during the life of some other person, or during two or more joint lives, or during the life of the longest liver or survivor among a number of persons named. If a person having a certain capital, and intending to spend this capital and the income of it during his own life, could know precisely how long he should live, he might lend this capital at a certain rate during his life, and by taking every year, besides the interest, a certain amount of the capital, he might secure the same annual amount for his support during his life in such manner that he should have the same sum to spend every year, and consume precisely his whole capital during his But since he does not know how long he life. is to live, he agrees with the government or an annuity office to take the risk of the duration of his life, and the office agrees to pay him a cer-tain annuity during his life in exchange for the capital which he proposes to invest in this The probable duration of his life therewav. fore becomes a subject of computation; and for the purpose of making this calculation, tables of longevity are made by noting the proportions of deaths at certain ages in the same country or district. In the U.S. the granting of annuities is conducted by private companies or corporations. The following are the approved rates of the best managed companies: In consideration of \$1,000 paid to a company the annuity granted to a person aged 40 would be \$52.75; aged 45, \$58.10; aged 50, \$64.70; uged 55, \$73.50; aged 60, \$86.20; aged 65, \$100; aged 70, \$123.45; aged 75, \$145.95; aged 80, \$180.15. The purchase of annuities. as a system, has never gained much foothold in the U.S.-the endowment plan of life insurance, by which after the lapse of a term of years the insured receives a sum in bulk, being preferred. In England the granting of annuities is conducted by the government.

An'ode, the positive pole of the voltaic current, being that part of the surface of a decomposing body which the electric current enters: opposed to *cathode*, the way by which it departs.

Anquetil - Duperron (ank-tēl-du-pā-ron), ABRAHAM HYACINTHE (1731-1805), a French Orientalist. His zeal for the Oriental languages induced him to set out for India, where he prevailed on some of the Parsee priests to instruct him in the Zend and Pehlevi and to give him some of the Zoroastrian books. In 1762 he returned to France with a valuable collection of MSS. In 1771 he published his Zend-Aresta, a translation of the Vendidad, and other sacred books, which excited great sensation. His knowledge of the Oriental languages was by no means exact.

Ans'gar (or Anshar) (801-865), called the "Apostle of the North," was born in Picardy, and took the monastic vows while still in his boyhood. In the midst of many difficulties he labored as a missionary in Denmark and Sweden; obtaining the reputation of having undertaken, if not the first, the most successful attempts for the propagation of Christianity in the North.

An'son, GEORGE, LORD (1697-1762). celebrated English navigator. He entered the navy at an early age and became a commander in 1722, and captain in 1724. His adventures and discoveries are described in the well-known Anson's Voyage, compiled from materials furnished by Anson.

Ansonia, New Haven co., Conn., on Naugatuck River, 12 mi. n.w. of New Haven. Railroads: Naugatuck and Berkshire division, consolidated system. Industries: iron foundry, brass and copper foundry, clock, eyelet, dial factories, and other smaller industries. Surrounding country agricultural. Was first settled about 1845 and became a city about 1890. Pop. est. 1897, 11,000.

Anspach (an'spah) (or Ansbach), a town in Bavaria, 24 mi. s.w. of Nürnberg. Anspach gave its name to an ancient principality or margravate, which had a territory of about 1,300 sq. mi., with 300,000 inhabitants, in the end of the eighteenth century. The last margrave sold his possessions in 1791 to Prussia. It was occupied by the French in 1806, and transferred by Napoleon to Bavaria. The town has manufactures of trimmings, buttons, straw-wares, etc. Pop. 14,195.

Ant, the common name of membranouswinged insects of various genera, found in most temperate and tropical regions. They are small but powerful insects, and have long been noted for their remarkable intelligence and interesting habits. They live in communities regulated by definite laws, each member of the society bearing a well-defined and separate part of the work of the colony. Each community consists of males; of females much larger than the males; and of barren females, otherwise called neuters, workers, or nurses. The neuters are wingless, and the males and females only acquire wings for their "nuptial flight," after which the males perish, and the few females which escape the pursuit of their numerous enemies, divest themselves of their wings, and either return to establish nests, or become the foundresses of new colonies. The neuters perform all the labors of the ant-hill or abode of the community; they excavate the galleries, procure food, and feed the larvæ or young ants, which are destitute of organs of motion. In fine weather they carefully convey them to the surface for the benefit of the sun's heat, and as attentively carry them to a place of safety either when bad weather is threatened, or the ant-hill is disturbed. In like manner they watch over the safety of the nymphs or pupze about to

acquire their perfect growth. Some communities possess a special type of neuters, known as "soldiers," from the duties that especially fall upon them, and from their powerful biting jaws. There is a very considerable variety in the materials, size, and form of ant-hills, or nests, according to the peculiar nature or instinct of the species. Most of American ants form nests in woods, fields, or gardens, their abodes being generally in the form of small mounds rising above the surface of the ground and containing numerous gal-leries and apartments. Some excavate nests in old tree trunks. Houses built by the common wood-ant are frequently as large as a small hay-cock. Some ants live on animal food, very quickly picking quite clean the skeleton of any dead animal they may light on. Others live on saccharine matter, being very fond of the sweet substance called honeydew, which exudes from the bodies of Aphi-des, or plant-lice. These they sometimes keep in their nests, and sometimes tend on the plants where they feed; sometimes they even superintend their breeding. By stroking the Aphides with their antennæ they cause them to emit the sweet fluid, which the ants then greedily sip up. Various other insects are looked after by ants in a similar manner, or are found in their nests. It has been observed that some species, like the Sanguinary Ant, resort to violence to obtain working ants of other species for their own use, plundering the nests of suitable kinds of their larvæ and pupie, which they carry off to their own nests to be carefully reared and kept as slaves. In temperate countries male and female ants survive, at most, till autumn, or to the commencement of cool weather, though a very large proportion of them cease to exist long previous to that time. The neuters pass the winter in a state of torpor, and of course require no food. The only time when they require food is during the season of activity, when they have a vast number of young to feed. Some ants of Southern Europe feed on grain, and store it up in their nests for use when required. Some species have stings as weapons, others only their powerful mandibles, or an they can emit. The name ant is also given to the neuropterous insects otherwise called Termites.

There is a family of ants which pays particular funeral honors to the dead. Whenever one of their number is found dead the whole number of occupants of the ant-hill is notified, and they turn out *en masse* to convey the deceased member to his last resting-place. They proceed slowly two-by-two to the place where the dead is lying. Two ants take up the dead one and march off, followed by two others as mourners. These two empty-handed followers relieve their fellows in advance, the latter following behind in the place of those who relieve them, continuing to alternate from time to time. When they have reached the place of burial, about half the number take part in digging the grave. The dead body is





## Antæus

laid in and the other half of the ants cover it up. In one instance which was observed, about a half dozen ants did not take part in the ceremonies, standing idly by, and on these the others fell and killed them, and buried them, not in separate graves, but all in one large pit. The ants then all paired off, marched back to the place where they found the dead, and after a few minutes, retired to their own habitations.

There is another peculiar ant known as the umbrella or parasol ant on account of the curious habit it has of carrying a leaf in its mouth. The stem of the leaf is held in the



Umbrella Ant.

mouth, and the palm extends back over the head. These leaves are employed in house building. In the accompanying illustration is shown an umbrella ant on the march.

Antæ'us, the giant son of Poseidon (Neptune) and Gö (the Earth), who was invincible so long as he was in contact with the earth. Heracles (Hercules) grasped him in his arms and stifled him suspended in the air.

Antananarivo (an-tan-an-a- $r\bar{e}' - v\bar{o}$ ), the capital of Madagascar. It contained two royal palaces, immense timber structures, one of which has been lately surrounded with a massive stone veranda with lofty corner towers. It has manufactures of metal work, cutlery, silk, etc., and exports sugar, soap, and oil. Pop. about 100,000.

Antarctic (ant-ürk'tik), relating to the southern pole or to the region near it. The Antarctic Circle is a circle parallel to the equator and distant from the south pole 23° 28', marking the area within which the sun does not set when on the Trapic of Capricorn. The Antarctic Circle has been arbitrarily fixed on as the limits of the Antarctic Ocean, it being the average limit of the pack-ice; but the name is often extended to embrace a much wider area. The lands in or near the Antarctic Circle are but imperfectly known, the work of exploration having been hitherto baffied by what seems an unsurmountable ice-barrier. Sir James Ross reached the highest south latitude yet attained in 1841-42, discovering Victoria Land, with its volcanoes, Erebus (12,400

## Antennæ

ft.) and Terror (10,900 ft.). The South Shetland Islands, Enderby Land, Graham's Land, etc., have also been discovered in this ocean.

Ant-eater, a name given to mammals of various genera that prey chiefly on ants, but usu-



Great Ant-eater.

ally confined to one genus of the toothless order. In this genus the head is remarkably elongated, the jaws destitute of teeth, and the mouth furnished with a long extensile tongue covered with glutinous saliva, by the aid of which the animals secure their insect prey. The eyes are particularly small, the ears short and round, and the legs, especially the anterior, very robust, and furnished with long, compressed, acute nails, admirably adapted for breaking into the ant-hills. The most remarkable species is the ant-bear, a native of the warmer parts of South America. It is from 4 to 5 feet in length from the tip of the muzzle to the origin of the black bushy tail, which is about two feet long. The body is covered with long hair, particularly along the neck and back. It is a harmless and solitary animal, and spends most of its time in sleep. Some are adapted for climbing trees in quest of the insects on which they feed, having prehensile tails. All are natives of South America. The name ant-eater is also given to The the pangolins and to the aardvark. echidna of Australia is sometimes called porcupine ant-eater.

An'telope, the name given to the members of a large family of Mammalia, closely resembling the deer in general appearance, but essentially different in nature from the latter animals. They are included with the sheep and oxen in the family of the Cavicornia or "hollow-horned" ruminants. Their horns, unlike those of the deer, are not deciduous, but are permanent; are never branched, but are often twisted spirally, and may be borne by both sexes. They are found in greatest number and variety in Africa. Well-known species are the chamois (European), the gazelle, the addax, the eland, the koodoo, the gnu, the springbok, the sasin or Indian antelope, and the prongbuck of America.

Antennæ (or feelers), the anterior appendages on the head of crustaceans, insects, and myriapods. The lobster has two pairs of feelers, while insects and myriapods have only one pair. The name may also be applied to sensory processes on the head of some marine worms. They are really "head-legs" modified for sensory purposes, and consist of a long

#### Antequera

series of joints, sometimes over 100 in number. They are supplied with nerve branches, and are used by the animals for feeling their way, for testing surrounding objects, and apparently for communicating with one another. The olfactory function of the antennæ of the cockroach has been demonstrated, but some insects can smell their food even when robbed of their feelers. The smelling bristles of the blowfly occur very abundantly on the third



Various Forms of Antennæ.

joint of the antennæ. Peculiar sensory cones and knobs occur on the antennæ of some myriapods. The small antennæ of the lobster bear olfactory bristles, and have an ear lodged at the base. And in short there are numerous observations to justify the general statement that in many cases the antennæ are sensitive to smell, sound, and probably taste. Deprived of its antennæ, an ant, for instance, is peculiarly helpless.

Antequera (ån-te-kā'rå), a city of Andalusia, in Spain, in the province of Malaga, a place of some importance under the Romans, with a ruined Moorish castle. Manufactures of woolens, leather, soap, etc. Pop. 27,201.

Ant'eros, in Greek mythology, the god of mutual love. According to some, however, Anteros is the enemy of love, or the god of antipathy; he was also said to punish those who did not return the love of others.

Anthe' mius, a Greek mathematician and architect of Lydia; designed the church of St. Sophia at Constantinople, and is credited with the invention of the dome; d. A. D. 534.

Anthol'ogy, the name given to several collections of short poems which have come down from antiquity. The first who compiled a Greek Anthology was Meleager, a Syrian, about 60 B. c. Later collections are that of Constantine Cephalas, in the tenth century, and that of Maximus Planudes, in the fourteenth century. There are also Arabic, Persian, Turkish, etc., anthologies.

An'thon, CHARLES, LL.D. (1797-1867), an American editor of classical school-books, and of works intended to facilitate the study of Greek and Latin literature. He was long a professor in Columbia College, New York.

An'thony, HENRY BOWEN (1815-1884), born in Coventry, R. I. He graduated in 1833 at Brown University, and edited the Providence Journal from 1838 to 1859. He was governor of Rhode Island, 1849-1851, and in 1859 was elected as a Republican to the U. S. Senate. He was four times re-elected to the Senate, and was chosen president pro tem. of that body in 1803, 1869, and 1871.

An'thony, SUSAN B., b. 1820, in South Adams, Mass.; became an anti-slavery and totalabstinence orator and an advocate of female suffrage.

An thracite, glance or blind coal, a nonbituminous coal of a shining luster, approaching to metallic, and which burns without smoke, with a weak or no flame, and with intense heat. See *Coal*.

An'thrax, a fatal disease to which cattle, horses, sheep, and other animals are subject, always associated with the presence of an extremely minute micro-organism in the blood. It frequently assumes an epizootic form, and extends over large districts, affecting all classes of animals which are exposed to the exciting causes. It is also called splenic fever, and is communicable to man, appearing as carbuncle, malignant pustule, or woolsorter's disease.

Anthropoid Apes, the highest and most manlike monkeys, including Gorilla, Chimpanzee, Orang-utan, Gibbon, and several other species. described by the They are technically Linnæan title Anthropomorpha, and readily distinguished, as tailless, semi-erect, and long-armed, from the dog-like apes, which have also a narrow partition between the nos-trils, and also inhabit the Old World. With the decidedly lower flat-nosed New-World monkeys, there is no possibility of confusion. The anthropoid apes are all arboreal, and inhabit Africa, Southeastern Asia, and the Malay Archipelago. In all, about a dozen species have been described with more or less definiteness. The family is of special interest and importance in connection with the views held by evolutionists as to the descent of man. It is recognized by anatomists that all the attempts to establish a fundamental distinction, on anatomical grounds, between the physical structure of the higher apes and that of man are futile. Generic differences, indeed, there are in abundance, but these establish only a difference of degree, and not of kind. Thus, in man, the great toe is not opposable to the others for grasping purposes, the angle between the face and the top of the skull does not exceed 120°, the teeth form an uninterrupted series, and so on; while the strong spines on the back of the gorilla's neck, the very marked eyebrow ridges in gorilla and chimpanzee, the especially long arms of the gibbon, and the protruding jaws of all the anthropoids, are equally characteristic adaptations to different ways of life. Even in the minutiæ of blood-vessels, muscles, nerves, and brain-convolutions, impartial observers have

#### Authropology

demonstrated the closest resemblance. The difference of structure between the lowest monkeys and the higher are far greater than those between man and any anthropoid ape, the resemblance being especially obvious when young forms are compared. In their expressions of cerebral activity, whether intellectual or emotional, the anthropoids come in some respects very near the lowest human tribes,

On the other hand, while it is impossible to establish any fundamental distinction in physical structure between Homo and the Anthropomorpha, there is among evolutionists an equal consensus of opinion as to the impossi-

#### Antigonus

bolical, mentioned or alluded to in various other passages both of the Old and New Testament

Anticos'ti, an island of Canada, in the mouth of the St. Lawrence, 125 mi. long by 30 mi. broad. The interior is mountainous and wooded, but there is much good land, and it is well adapted for agriculture. The fisheries are valuable. The population is scanty, however.

Antietam (an-tē'tam), a small stream in Maryland which falls into the Potomac about 50 mi. n.w. of Washington; scene of a battle between the Federal and Confederate armies, Sept. 17, 1862. The Union army numbered



Skeletons of Anthropoid Apes Compared with that of Man-

bility of regarding an ape of any existing anthropoid species as in the direct line of human ancestry. As regards brain-structure, the most man-like ape is the orang, while the chimpanzee has the most closely related skull, the gorilla the most human feet and hands, the gibbon the most similar chest. The study of anthropoid fossils has not yet discovered the remains of any form which can be accepted as the "missing link," although extinct anthropoids, such as Dryopithecus, unquestionably serve to lessen the distance to be bridged over.

Anthropol'ogy, the science of man and mankind, including the study of man's place in nature, that is, of the measure of his agreement with and divergence from other animals; of his physical structure and psychological nature, together with the extent to which these act and react on each other; and of the various tribes of men, determining how these may have been produced or modified by external conditions, and consequently taking account also of the advance or retrogression of the human race. It puts under contribution all sciences which have man for their object, as archæology, comparative anatomy, physiology, psychology, climatology, etc. See Ethnology.

An'tichrist, a word occurring in the first and second epistles of St. John, and nowhere else in Scripture, in passages having an evident reference to a personage, real or sym87,000 under General McClellan while Gen. R. E. Lee commanded some 70,000 Confederate soldiers. After two days' fighting the Confederates asked for an armistice to bury their dead and then retreated across the Potomac. The Union loss was about 12,500 killed, wounded, and missing, while the Confederates, having the advantage of shelter in the woods, lost about 9,000.

'Antifriction Metal, a name given to various alloys of tin, zinc, copper, antimony, lead, etc., which oppose little resistance to motion, with great resistance to the effects of friction, so far as concerns the wearing away of the surfaces of contact. Babbitt's metal (50 parts tin, 5 antimony, 1 copper) is one of them.

Antigone (an-tig'o-nē), in Greek mythology, the daughter of Ædipus and Jocasta, celebrated for her devotion to her father and to her brother Polynices, for burying whom, against the decree of King Creon, she suffered death. She is heroine of Sophocles's Ædipus at Colonus and his Antigone; also of Racine's tragedy, Les Freres Ennemis.

**Antig** onish, a town in the e. of Nova Scotia, in county of the same name; the seat of a Roman Catholic bishop, with a cathedral, a college, and a good harbor. Pop. 3,500.

Antig'onus, one of the generals of Alexander the Great, born about 382 B. c. After the death of Alexander. Antigonus obtained Greater Phrygia, Lycia, and Pamphylia as his dominion. Ptolemy, Cassander, and Lysimachus, alarmed by his ambition, united themselves against him; and a long series of contests ensued in Syria, Phœnicia, Asia Minor, and Greece, ending in 301 B. c. with the battle of Ipsus in Phrygia, in which Antigonus was defeated and slain.—ANTIGONUS GON'ATAS, son of Demetrius Poliorcētēs, and grandson of the above, succeeded his father in the kingdom of Macedon and all his other European dominions; died after a reign of forty-four years, B. c. 239.

Antigua (an-tē'ga), one of the British West Indies, the most important of the Leeward group. Area 108 sq. mi. Discovered by Columbus, 1493. Its shores are high and rocky: the surface is varied and fertile. The capital, St. John, the residence of the governor of the Leeward Islands, stands on the shore of a well-sheltered harbor in the n. w. part of the island. The staple articles of export are sugar, molasses, and rum. Pop. (including Barbuda), 34,904.

Anti-Lebanon, the eastern of the two parallel ranges known as the Mountains of Lebanon in Palestine.

An' timony, a brittle metal of a bluish-white or silver-white color, and a crystalline or laminated structure. It melts at  $842^{\circ}$  F., and burns with a bluish-white flame. The mineral called stibuite or antimony-glance, is a tri-sulphide, and is the chief ore from which the metal is obtained. It is found in many places, including Mexico, France, Spain, Hungary, Italy, Canada, Australia, and Borneo. The metal, or as it was formerly called, the regulus of antimony, does not rust or tarnish when exposed to the air. When alloyed with other metals it hardens them, and is therefore used in the manufacture of alloys, such as Britannia-metal, type-metal, and pewter. In bells it renders the sound more clear; it renders tin more white and sonorous as well as harder, and gives to printing types more firmness and smoothness. The salts of antimony are very poisonous. The protoxide is the active base of tartar emetic and James's powder, and is justly regarded as a most valuable remedy in many diseases. *Yellow antimony* is a preparation of antimony of a deep yellow color, used in enamel and porcelain painting. It is of various tints, and the brilliancy of the brighter hues is not affected by foul air.

Antino' mianism ("opposition to the law"), the name given by Luther to the inference drawn by John Agricola from the doctrine of justification by faith, that the moral law is not binding on Christians as a rule of life. The term antinomian has since been applied to all doctrines and practises which seem to condemn or discountenance strict moral obligations. The Lutherans and Calvinists have both been charged with antinomianism; the former on account of their doctrine of justification by faith, the latter both on this ground and that of the doctrine of predestination. The charge is, of course, vigorously repelled by both.

Antinous (an-tin'o-us), a young Bithynian whom the extreme love of Hadrian has immortalized. He drowned himself in the Nile in 122 A. D. Hadrian set no bounds to his grief for his loss. He gave his name to a newlydiscovered star, erected temples to his honor, called a city after him, and caused him to be adored as a god throughout the empire. Statues, busts, etc., of him are numerous.

Antioch (an'ti-ok), a famous city of aucient times, the capital of the Greek kings of Syria, on the left bank of Orontes, about 21 mi. from the sea, in a beautiful and fertile plain; founded by Seleucus Nicator in 300 B. c., and named after his father Antiochus. In Roman times it was the seat of the Syrian governors, and the center of a widely-extended commerce. It was called the "Queen of the East," and "The Beautiful." Antioch is frequently mentioned in the New Testament, and it was here that the disciples of our Saviour were first called Christians (Acts 11:26). In the first half of the seventh century it was taken by the Saracens, and in 1098 by the Crusaders. They established the principality of Antioch, of which the first ruler was Bohemond, and which lasted till 1268, when it was taken by the Mameluke sultan of Egypt. In 1516 it passed into the hands of the Turks. The modern Antioch, or Antakieh, occupies but a small portion of the site of the ancient Antioch. Pop. est. 10,000. There was another Antioch, in Pisidia, at which Paul preached on his first missionary journey

Antiochus (an-ti'o-kus), a name of several Græco-Syrian kings of the dynasty of the Seleusidie, who reigned B. c. 324-164.

Antioquia (ån-tē-ō-kē'à), a town of South America, in Colombia, on the River Cauca; founded in 1542. Pop. 10,000. It gives name to a department of the republic. Area 22,316 sq. mi.; pop. 365,974. Capital, Medellin.

Antip'ater, a general and friend of Philip of Macedon, father of Alexander the Great. On the death of Alexander, in 323 B. C., the regency of Macedonia was assigned to Antipater, who succeeded in establishing the Macedonian rule in Greece on a firm footing. He died in B. C. 317 at an advanced age.

An'tiphon, a Greek orator, born near Athens; founder of political oratory in Greece. His orations are the oldest extant, and he is said to have been the first who wrote speeches for hire. He was put to death for taking part in the revolution of B. c. 411, which established the oligarchic government of the Four Hundred.

An'tipope, the name applied to those who at different periods have produced a schism in the Catholic Church by opposing the authority of the pope, under the pretense that they were themselves popes. The Roman Church cannot admit that there ever existed two popes; but the fact is, that in several cases both competitors for the papal chair (sometimes there were three or even four) were equally popes; that is to say, the claims of all were equally good. Each was frequently supported by whole nations, and the schism was nothing but the struggle of political interests, which induced particular governments to support a pope

against the pope supported by other governments. The greatest schism of this kind lasted for fifty years - 1378-1429.

Antisana (ån-tē-sä'nå), a volcano in the Andes of Ecuador, 35 mi. e.s.e. of Quito. Whymper, who ascended it in 1880, makes its height 19,260 feet.

Antiseptic (to rot), an agent by which the putrefaction of vegetable or animal matter is prevented or arrested. There are a great number of substances having this preservative property, among which are salt, alcohol, vegetable charcoal, creosote, corrosive sublimate, tannic acid, sulphurous acid, sulphuric ether, chloroform, arsenic, wood-spirit, aloes, camphor, benzine, aniline, etc. The packing of fish in ice, and the curing of herring and other fish with salt, are familiar antiseptic The different antiseptics act in processes. different ways. The term is applied in a specific manner to that mode of treatment in surgery by which air is excluded from wounds, or allowed access only through substances capable of destroying the germs in the atmosphere on whose presence suppuration is assumed to depend.

Ant-lion, the larva of a Neuropterous insect which in its perfect state greatly resembles a dragon-fly; curious on account of its ingenious method of catching the insects — chiefly ants — on which it feeds. It digs a funnel-shaped hole in the driest



#### Ant-lion.

and finest sand it can find, and when the pit is deep enough, and the sides are quite smooth and sloping, it buries itself at the bottom with ouly its formidable mandibles projecting, and waits till some luckless insect stumbles over the edge, when it is immediately seized, its juices sucked, and the dead body jerked from the hole.

Antofagas'ta, a Chilean seaport on the Bay of Morena; and a territory of the same name recently taken from Bolivia. The territory has an area of 60,988 sq. mi., and a pop. of 21,213. The port is connected by railway with the silver mines of Caracoles, and

#### Antoninus

exports silver, copper, cubic niter, etc. Pop. 7,946.

Antoinette (ån-twå-net), MARIE (Marie Antoinette Joseph Jeanne de Lorraine) (1755-1793), Archduchess of Austria and Queen of France, the youngest daughter of the Emperor Francis I and of Maria Theresa, was born at Vienna, executed at Paris. She was married at the age of fifteen to the Dauphin, afterward Louis XVI, but her manners were ill-suited to the French court, and she made many enemies among the highest families by her contempt for its ceremonies, which excited her ridicule. The freedom of her manners, indeed, even after she became queen, was a cause of scandal. The extraordinary affair of the diamond necklace, in which the Cardinal Louis de Rohan, the great quack Cagliostro, and a cer-tain Countess de Lamotte were the chief actors, tarnished her name, and added force to the calumnies against her. Though it was proved in the examination which she demanded that she had never ordered the necklace, her enemies succeeded in casting a stigma on her, and the credulous people laid every public disaster to her charge. There is no doubt she had great influence over the king, and that she constantly opposed all measures of reform. The enthusiastic reception given her at the guard's ball at Versailles on Oct. 1, 1789, raised the general indignation to the highest pitch, and was followed in a few days by the insurrection of women, and the attack on Versailles. When practically prisoners in the Tuileries it was she who advised the flight of the royal family in June, 1791, which ended in their capture and return. On Aug. 10, 1792, she heard her husband's deposition pronounced by the Legislative Assembly, and ac-companied him to the prison in the Temple, where she displayed the magnanimity of a heroine and the patient endurance of a martyr. In January, 1793, she parted with her husband who had been condemned by the Convention; in August she was removed to the Conciergerie; and in October she was charged before the revolutionary tribunal with having dissipated the finances, exhausted the treasury, corresponded with the foreign ene-mies of France, and favored the domestic foes of the country. She defended herself with firmness, decision, and indignation; and heard the sentence of death pronounced with perfect calmness — a calmness which did not forsake her when the sentence was carried out the following morning. Her son, eight years of age, died shortly afterward, as was generally believed by poison, and her daughter was suffered to quit France, and afterward married her cousin, the Duke of Angoulême.

Antonell'o (of Messina), an Italian painter who died in the end of the sixteenth century, and is said to have introduced oil-painting into Italy (at Venice), having been instructed in it by John Van Eyck.

Antoni nus, Wall of, a barrier erected by the Romans across the isthmus between the Forth and the Clyde, in Scotland, in the reign of Antoninus Pius. Its whole length exceeded 27 miles. It may still be traced at various points, and is commonly known as *Graham's Dyke*.

Antoni'nus Plus, TITUS AURELIUS FULVUS (86-161 A. D.), Roman emperor. In A. D. 120 he became consul, and he was one of the four persons of consular rank among whom Hadrian divided the supreme administration of Italy. He then went as proconsul to Asia. In A. D. 138 he was selected by that emperor as his successor, and the same year he as-cended the throne. The persecutions of the Christians he speedily abolished. He carried on but a few wars. In Britain he extended the Roman dominion, and by raising a new wall put a stop to the invasions of the Picts and Scots. The senate gave him the surname *Pius*, that is, dutiful or showing filial affection, because to keep alive the memory of Hadrian he had built a temple in his honor. He was succeeded by Marcus Aurelius, his adopted son.

Antony, MARK (Marcus Antonius) (B. C. 83-30), Roman triumvir, was connected with the family of Cæsar by his mother. Debauchery and prodigality marked his youth. To escape his creditors he went to Greece in 58, and from thence followed the consul Gabinius on a campaign in Syria as commander of the cavalry. He served in Gaul under Cæsar in 52 and 51. In 50 he returned to Rome to support the interests of Cæsar against the aristocratical party headed by Pompey, and was appointed tribune. When war broke out between Cæsar and Pompey, Antony led reinforcements to Cæsar in Greece, and in the battle of Pharsalia he commanded the left wing. He afterward returned to Rome with the appointment of master of the horse and governor of Italy (47). In B. c. 44 he became Cæsar's colleague in the consulship. Soon after, Cæsar was assassinated, and Antony would have shared the same fate had not Brutus stood up in his behalf. Antony, by the reading of Cæsar's will, and by the oration which he delivered over his body, excited the people to anger and revenge, and the murderers were obliged to flee. After several quarrels and reconciliations with Octavianus, Cæsar's heir, Antony departed to Cisalpine Gaul, which province had been conferred upon him against the will of the senate. But Cicero thundered against him in his famous Philippics; the senate declared him a public enemy, and intrusted the conduct of the war against him to Octavianus and the consuls Hirtius and Pansa. After a campaign of varied fortunes Antony fled with his troops over the Alps. Here he was joined by Lepidus. who commanded in Gaul, and through whose mediation Antony and Octavianus were again reconciled. It was agreed that the Roman world should be divided among the three conspirators, who were called triumvirs. Antony was to take Gaul; Lepidus, Spain; and Oc-tavianus, Africa and Sicily. They decided upon the proscription of their mutual enemies, each giving up his friends to the others, the most celebrated of the victims being Cicero the orator. Antony and Octavianus departed

in 42 for Macedonia, where the united forces of their enemies, Brutus and Cassius, formed a powerful army, which was, however, speedily defeated at Philippi. Antony next visited Athens, and thence proceeded to Asia. In Cilicia he ordered Cleopatra, queen of Egypt, to apologize for her insolent behavior to the triumviri. She appeared in person, and her charms fettered him forever. He followed her to Alexandria, where he bestowed not even a thought upon the affairs of the world, till he was aroused by a report that hostilities had commenced in Italy between his own relatives and Octavianus. A short war followed, which was decided in favor of Octavianus before the arrival of Antony in Italy. A reconciliation was effected, which was sealed by the marriage of Antony with Octavia, the sister of Octavianus. A new division of the Roman dominions was now made (in 40), by which Antony obtained the east, and Octavianus the west. After his return to Asia, Antony gave himself up entirely to Cleopatra, assuming the style of an eastern despot, and so alienating many of his adherents and embittering public opinion against him at Rome. At length war was declared at Rome against the queen of Egypt, and Antony was deprived of his consulship and government. Each party assembled its forces, and Antony lost, in the naval battle at Actium (B. C. 31), the dominion of the world. He followed Cleopatra to Alexandria, and on the arrival of Octavianus, his fleet and cavalry deserted, and his infantry was defeated. Deceived by a false report which Cleopatra had disseminated of her death, he fell upon his own sword.

An 'trim, a county of Ireland, province of Ulster, in the n.e. of the island. Area 762,080 acres, of which about a third are arable. A range of basaltic strata stretches along the northern coast, of which the celebrated Giant's Causeway is the most remarkable portion. The spinning of linen and cotton yarn, and the weaving of linen and cotten are the staple manufactures. The principal towns are Belfast, Ballymena, and Larne. Pop. 427,968.— The town of Antrim, at the north end of Lough Neagh, is a small place with a population of 2,020.

Ant' werp, the chief port of Belgium, and the capital of a province of the same name, on the Scheldt, about 50 miles from the open sea. It is strongly fortified, being completely surrounded on the land side by a semicircular inner line of fortifications, the defenses being completed by an outer line of forts and outworks. The cathedral, with a spire 400 feet high, one of the largest and most beautiful specimens of Gothic architecture in Belgium, contains Rubens's celebrated masterpieces— the Descent from the Cross, the Elevation of the Cross, and The Assumption. The other churches of note are St. James's, St. Andrew's, and St. Paul's, all enriched with paintings by Rubens, Vandyck, and other masters. The harbor accommodation is extensive. The shipping trade has greatly advanced in recent times, and is now very large, the goods being

largely in transit. There are numerous and varied industries. Antwerp is mentioned as early as the eighth century. In the sixteenth century it is said to have had a population of 200,000. The wars between the Netherlands and Spain greatly injured its commerce, which was almost ruined by the closing of the navigation of the Scheldt in accordance with the peace of Westphalia (1648). It is only in the present century that its prosperity has revived. Pop. 204,498. The province consists of a fertile plain 1,100 sq. mi. in area, and has a population of 652,061.

Anu bis, one of the deities of the ancient Egyptians, the son of Osiris by Isis. His office was to conduct the souls of the dead from this world to the next.

Anvil, an instrument on which pieces of metal are laid for the purpose of being ham-mered. The common smith's anvil is generally made of seven pieces; namely, the core or body; the four corners for the purpose of enlarging its base; the projecting end, which contains a square hole for the reception of a set or chisel to cut off pieces of iron; and the beak or conical end, used for turning pieces of iron into a circular form, etc. These pieces are each separately welded to the core and hammered so as to form a regular surface with the whole. When the anvil has received its due form, it is faced with steel, and is then tempered in cold The smith's anvil is generally placed water. loose upon a wooden block. The anvil for heavy operations, such as the forging of ordnance and shafting, consists of a huge iron block deeply imbedded, and resting on piles of masonry

Aor'ta, in anatomy, the great artery or trunk of the arterial system, proceeding from the left ventricle of the heart, and giving origin to all the arteries except the pulmonary. It first rises toward the top of the breast-bone, when it is called the *ascending aorta*; then makes a great curve, called the transverse or

great arch of the aorta, whence it gives off branches to the head and upper extremities; thence proceeding toward the lower extremities, under the name of the descending aorta, it gives off branches to the trunk; and finally divides into the two iliacs, which supply the pelvis and lower extremities.

Apaches (a-pä' chez), a warlike race of Indians inhabiting Arizo-

Apache.

inhabiting Arizona, New Mexico, and the northern states of Mexico. Ages ago they migrated from the vicinity of the Great Slave Lake in Canada: they have become the veritable Ishmaels of the West. For years they carried on a guerrilla warfare with settlers and troops. Their leader, Geronimo, was captured by General Miles and with other hostiles, kept as prisoners of war. Civilization is slowly benefiting the-Apaches on the San Carlos and White Mountain reservations in Arizona. One highly educated Apache, Antonio Apache, was one of the officials of the department of anthropology at the World's Columbian Exposition in Chicago, 1803.

Ap'atite, a translucent but seldom transparent mineral, a compound of phosphate of lime with fluoride and chloride of calcium. It occurs principally in primitive rocks and in veins, extensive deposits being found in all parts of the world. It is now largely utilized as a source of artificial phosphate manures.

Ape, a common name of a number of quadrumanous animals inhabiting the Old World (Asia and the Asiatic islands, and Africa), and including a variety of species. The word ape was formerly applied indiscriminately to all quadrumanous mammals; but it is now limited to the anthropoid or man-like monkeys. The family includes the chimpanzee, gorilla, orangoutang, etc.

Apelles (a-pel'ez), the most famous of the painters of ancient Greece and of antiquity, was born in the fourth century B. C., probably at Colophon. Ephorus of Ephesus was his first teacher, but attracted by the renown of the Sicyonian school he went and studied at Sicyon. In the time of Philip he went to Macedonia, and there a close friendship between him and Alexander the Great was established. The most admired of his pictures was that of Venus rising from the sea and wringing the water from her dripping locks. His portrait of Alexander with a thunderbolt in his hand was no less celebrated. His renown was at its height about B. c. 330, and he died about the end of the century. Among the anecdotes told of Apelles is the one which gave rise to the proverb, "Let not the shoemaker go beyond his shoe." Having heard a cobbler point out an error in the drawing of a shoe in one of his pictures he corrected it, whereupon the cobbler took upon him to criticise the leg, and received from the artist the famous reply.

Ap ennines, a prolongation of the Alps, forming the "backbone of Italy." The average height of the mountains composing the range is about 4,000 feet, and nowhere do they reach the limits of perpetual snow, though some summits exceed 9,000 feet in height. They consist almost entirely of limestone rocks, and are exceedingly rich in the finest marbles. On the south slopes volcanic masses are not uncommon. Mount Vesuvius, the only active volcano on the continent of Europe, is an instance. The lower slopes are well clothed with vegetation, the summits are sterile and bare.

Apha'sia, in pathology, a symptom of certain morbid conditions of the nervous system, in which the patient loses the power of expressing ideas by means of words, or loses the



appropriate use of words, the vocal organs the while remaining intact and the intelligence sound. There is sometimes an entire loss of words as connected with ideas, and sometimes only the loss of a few. In one form of the disease, called *aphemia*, the patient can think and write, but cannot speak; in another called *agraphia*, he can think and speak, but cannot express his ideas in writing. In a great majority of cases, where post-mortem examinations have been made, morbid changes have been found in the left frontal convolution of the brain.

**Aphrodite** (af-ro- $d\bar{i}'t\bar{e}$ ), the goddess of love among the Greeks; usually regarded as equivalent to the Roman Venus. A festival called Aphrodisia, was celebrated to her in various parts of Greece, but especially in Cyprus.

Aphthæ (af'thē), a disease occurring especially in infants, but occasionally seen in old persons, and consisting of small, white ulcers upon the tongue, gums, inside of the lips, and palate, resembling particles of curdled milk; commonly called *thrush* or *milk thrush*.

A'pia, the chief place and trading center of the Samoan Islands, on the north side of the island of Upolu. It was the scene of a terrible disaster to the American and German navies during a hurricane.

A'piary, a place for keeping bees. The apiary should be well sheltered from strong winds, moisture, and the extremes of heat and cold. The hives should face the south or southeast, and should be placed on shelves two feet above the ground, and about the same distance from each other. As to the form of the hives, and materials of which they should be constructed, there are great differ-ences of opinion. Wooden hives of square, boxlike form are now gaining general favor among bee keepers. They usually consist of a large breeding chamber below, and two sliding removable boxes called supers above, for the abstraction of honey without disturbing the contents of the main chamber. It is of great importance that the apiary should be situated in the neighborhood of good feeding grounds, such as gardens, clover fields, or heath-covered hills. When their stores of honey are removed the bees must be fed during the winter and part of spring with syrup or with a solution consisting of 2 lbs. loaf sugar to a pint of water. In the early spring slow and continuous feeding (a few ounces of syrup each day) will stimulate the queen to deposit her eggs, by which means the colony is rapidly strengthened and throws off early swarms. New swarms may make their appearance as early as May and as late as August, but swarming usually takes place in the intervening months.

Apic'ius, MARCUS GABIUS, a Roman epicure in the time of Augustus and Tiberius. who, having exhausted his vast fortune on the gratification of his palate, and having only about \$400,000 left, poisoned himself that he might escape the misery of plain diet. The book of cookery published under the name of Apicius was written by one Cælius, and belongs to a much later date.

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A'pls, a bull to which divine honors were paid by the ancient Egyptians, who regarded him as a symbol of Osiris. He was not suffered to live beyond twenty-five years, being secretly killed by the priests and thrown into a sacred well. Another bull was selected in his place. His birthday was annually celebrated, and his death was a season of public mourning.

Apoc'alypse, the name frequently given to the last book of the New Testament, in the English version called the Revelation of St. John the Divine. It is generally believed that the Apocalypse was written by the apostle John in his old age (95-97 A. D.) in the Isle of Patmos, whither he had been banished by the Roman emperor Domitian.

Apoc rypha (Greek, "things concealed or spurious"), a term applied in the earliest churches to various sacred or professedly inspired writings, sometimes given to those whose authors were unknown, sometimes to those with a hidden meaning, and sometimes to those considered objectionable. The term is specially applied to the fourteen undermentioned books which were written during the two centuries preceding the birth of Christ: The first and second books of Esdras. Tobit, Judith, the rest of the book of Esther, the Wisdom of Solomon, the Wisdom of Jesus the son of Sirach, or Ecclesiasticus, Baruch the Prophet, the Song of the Three Children, Susanna and the Elders, Bel and the Dragon, the Prayer of Manasses, and the first and second Books of Maccabees.

Apollina'ris Water, a natural aërated water, belonging to the class of acidulated soda waters, and derived from the Apollinarisbrunnen, a spring in the valley of the Ahr, near the Rhine, in Rhenish Prussia, forming a highly esteemed beverage.

Apol lo, son of Zeus (Jupiter) and Leto, the twin brother of Diana. He slew the serpent Python on the fifth day after his birth; afterward, with his sister Artemis, he killed the children of Niobe. He destroyed the Cyclops, because they forged the thunderbolts with which Zeus killed his son Æscula-Apollo was originally the sun god. In pius. later times the view was almost universal that Apollo and Helios were identical. From being the god of light and purity in physical sense, he gradually became the god of moral and spiritual light and purity, and political progress. He came to be regarded as the god of song and prophecy, the institutor and guardian of civil and political order, and the founder of cities. His worship was introduced at Rome. probably in the time of the Tarquins. Among the ancient statues of Apollo that have come down to us, the most remarkable is the one called the Apollo Belvedere, from the Belvedere Gallery in the Vatican at Rome.

Apoilo nius OF TYRE, the hero of a tale which had an immense popularity in the Middle Ages and which furnished the plot of Shakespeare's *Pericles*, *Prince of Tyre*. The story, originally in Greek, first appeared in the third century after Christ.

#### Apoplexy

Ap'oplexy, abolition or sudden diminution of sensation and voluntary motion, from suspension of the functions of the cerebrum, resulting from congestion or rupture of the blood-vessels of the brain and the resulting pressure on this organ. In a complete apoplexy the person falls suddenly, is unable to move his limbs or to speak, gives no proof of seeing, hearing, or feeling, and the breathing is stertorous or snoring, like that of a person in deep sleep. The premonitory symptoms of this dangerous disease are drowsiness, giddiness, dulness of hearing, frequent yawning, disordered vision, noise in the ears, vertigo, etc. It is most frequent between the ages of fifty and seventy. A large head, short neck, full chest, sanguine and plethoric constitution, and corpulency are generally considered signs of predisposition to it; but the state of the heart's action, with a plethoric condition of the vascular system, has a more marked in-fluence. Out of 63 cases carefully investigated only 10 were fat and plethoric, 23 being thin, and the rest of ordinary habit. Among the common predisposing causes are long and intense thought, continued anxiety, habitual indulgence of the temper and passions, sedentary and luxurious living, sexual indulgence, intoxication, etc. More or less complete recovery from a first and second attack is common, but a third is almost invariably fatal.

**Apos'tles** (literally, persons sent out), the twelve men whom Jesus selected to attend him during his ministry and to promulgate his religion. Their names were as follows: Simon Peter, and Andrew his brother; James, and John his brother, sons of Zebedee; Philip; Bartholomew; Thomas; Matthew; James, the son of Alpheus; Lebbeus, his brother, called Judas; Simon, the Canaanite; and Judas Iscariot. To these were subsequently added Matthias (chosen by lot in place of Judas Iscariot) and Paul. The Bible gives the name of apostle to Barnabas also, who accompanied Paul on his missions (Acts 14:14). In a wider sense those preachers who first taught Christianity in heathen countries are sometimes termed apostles; for example, St. Denis, the apostle of the Gauls; St. Boniface, the apostle of Germany; St. Augustine, the apostle of England; Francis Xavier, the apostle of Prussia proper. Their subsequent history is only imperfectly known.

history is only imperfectly known. **Apostles' Creed,** a well-known formula or declaration of Christian belief, formerly believed to be the work of the apostles themselves, but it can only be traced to the fourth century.

Apothecaries' weight, the weight used in dispensing drugs, in which the pound (lb.) is divided into 12 ounces, the ounce into 8 drams, the dram into 3 scruples, and the scruple into 20 grains, the grain being equivalent to that in avoirdupois weight.

Apoth ecary, in a general sense, one who keeps a shop or laboratory for preparing, compounding, and vending medicines, and for the

making up of medical prescriptions. It is well known that the word "apotheca" signified any kind of store, magazine, or warehouse, and that the proprietor or keeper of such a store was called apothecarius. The physicians in Africa first began to give up the preparation of medicines after prescriptions to in-genious men. It is probable, therefore, that many Arabic terms of art were by these means introduced into pharmacy and chemistry, and have been still retained and adopted. In England the term was long applied (and to some little extent still) to a regularly licensed class of medical practitioners, being such persons as were members of, or licensed by, the Apothecaries' Company in London. The Apothecaries' Company in London. The apothecaries of London were at one time ranked with the grocers, with whom they were incorporated by James I in 1606. In 1617, however, the apothecaries received a new charter as a distinct company. In the U. S. the several states have laws controlling apothecaries.

Apotheo'sis (deification), a solemnity among the ancients by which a mortal was raised to the rank of the gods. The custom of placing mortals who had rendered their countrymen important services, among the gods, was very ancient among the Greeks. The Romans, for several centuries, deified none but Romulus, and first imitated the Greeks in the fashion of frequent apotheosis after the time of Cresar. From this period apotheosis was regulated by the decrees of the senate, and accompanied with great solemnities. The greater part of the Roman emperors were dei-fied.

Appalachian Mountains (ap-pa-la'chi-an), also called Alleghanies, a vast mountain range in N. America extending for 1,300 mi. from Cape Gaspé, on the Gulf of St. Lawrence, s.w. to Alabama. The system has been divided into three great sections: the northern (including the Adirondacks, the Green Mountains, the White Mountains, etc.), from Cape Gaspé to New York; the central (including a large portion of the Blue Ridge, the Alleghanies proper, and numerous lesser ranges), from New York to the valley of the New River; and the *southern* (including the continuation of the Blue Ridge, the Black Mountains, the Smoky Mountains, etc., from the New River southward. The chain consists of several ranges generally parallel to each other, the altitude of the individual mountains increasing on approaching the south. The highest peaks rise over 6,600 feet (not one at all approaching the snow-level), but the mean height is about 2,500 feet. Lake Champlain is the only lake of great importance in the system, but numerous rivers of considerable size take their rise here. Magnetite, hematite, and other iron ores occur in great abundance and the coal-measures are among the most extensive in the world. Gold, silver, lead, and copper are also found, but not in paying quantities, while marble, limestone, fire-clay, gypsum, and salt abound. The forests covering many of the ranges yield large quantities of valuable timber, such as
sugar-maple, white birch, beech, ash, oak, cherry-tree, white poplar, white and yellow pine.

Appalachicola (chi-co'la), a river of the U.S. formed by the Chattahoochee and Flint Rivers, which unite near the northern border of Florida; length about 100 mi.; flows into the Gulf of Mexico and is navigable.

Appenzell (ap' pen-tsel), a Swiss canton. Area 162 sq. mi. It is divided into two independent portions or half-cantons, Ausser-Rhoden, which is Protestant, and Inner-Rhoden, which is Catholic. Glaciers occupy the higher valleys. Flax, hemp, grain, fruit, etc., are produced, but the wealth of Inner-Rhoden lies in its herds and flocks: that of Outer-Rhoden in its manufactures of embroidered muslins, gauzes, cambrics, and other cotton stuffs: also of silk goods and paper. The town of Appenzell (German Abtenzelle, abbot's cell) is the capital of Inner-Rhoden, on the Sitter, with about 4,300 inhabitants. Trogen is the capital of Outer-Rhoden, Herisau the largest town (pop. 11,000). Pop. of Outer-Rhoden, 51,960; Inner-Rhoden, 12,882.

Ap'petite, in its widest sense, means the natural desire for gratification, either of the body or the mind; but is generally applied to the recurrent and intermittent desire for food. A healthy appetite is favored by work, exercise, plain living, and cheerfulness; absence of this feeling, or defective appetite, indicates diseased action of the stomach, or of the nervous system or circulation, or it may result from vicious habits. Depraved appetite, or a desire for unnatural food, as chalk, ashes, dirt, soap, etc., depends often in the case of children on vicious tastes or habits; in grown up persons it may be symptomatic of dyspepsia, pregnancy, or chlorosis. Insatiable or canine appetite or voracity, when it occurs in childhood, is generally symptomatic of worms; in adults common causes are pregnancy, vicious habits, and indigestion, caused by stomach complaints or gluttony, when the gnawing pains of disease are mistaken for hunger.

**Appla'ni**, ANDREA, a painter (1754–1817), a painter born at Milan. As a fresco-painter he excelled every contemporary painter in Italy.

Applan Way, called Regina Viarum, the Queen of Roads; the oldest and most renowned Roman road, was constructed during the censorship of Appius Claudius Cæcus (B. c. 313-310). It was built with large square stones on a raised platform, and was made direct from the gates of Rome to Capua, in Campania. It was afterward extended through Samnium and Apulia to Brundusium, the modern Brindisi. It was partially restored by Pius VI, and in 1850-53 it was excavated by order of Pius IX, as far as the eleventh milestone from Rome.

Appius Claudius Crassus, one of the Roman decemvirs, appointed B. c. 451 to draw up a new code of laws. He and his colleagues plotted to retain their power permanently, and at the expiry of their year of office refused to give up their authority. The people were incensed

against them, and the following circumstances led to their overthrow: Appius Claudius had conceived an evil passion for Virginia, the daughter of Lucius Virginius, then absent with the army in the war with the Æqui and Sabines. At the instigation of Appius, Marcus Claudius, one of his clients, claimed Virginia as the daughter of one of his own female slaves, and the decemvir, acting as judge, decided that in the meantime she should remain in the custody of the claimant. Virginius, hastily summoned from the army, appeared with his daughter next day in the forum, and appealed to the people; but Appius Claudius again adjudged her to M. Claudius. Unable to rescue his daughter, the unhappy father stabbed her to the heart. The decemvirs were deposed by the indignant people B. c. 449, and Appius Claudius died in prison or was strangled.

Apple, the fruit of a well-known tree, or the tree itself. The apple belongs to the temperate regions of the globe, over which it is almost universally spread and cultivated. The tree attains a moderate height, with spreading branches; the leaf is ovate; and the flowers are produced from the wood of the former year, but more generally from very



Branch of apple with young fruit. a.—piece of blossom.

short shoots or spurs from wood of two years' growth. The original of all the varieties of the cultivated apple is the wild crab, which has a small and extremely sour fruit, and is a native of most of the countries of Europe. The apple was probably introduced into Britain by the Romans. To the facility of multiplying varieties by grafting is to be ascribed the amazing extension of the sorts of apples. Many of the more marked varieties are known by general names, as pippins, codlins, rennets, etc. Apples for the table are characterized by a firm, juicy pulp, a sweetish acid flavor, regu-

lar form, and beautiful coloring; those for cooking, by the property of forming, by the aid of heat, into a pulpy mass of equal consistency, as also by their large size and keeping properties; apples for cider must have a considerable degree of astringency, with richness of juice. The propagation of apple-trees is accomplished by seeds, cuttings, suckers, layers, budding, or grafting, the last being almost the universal practice. The tree thrives best in a rich, deep loam or marshy clay, but will thrive in any soil provided it is not too wet or too dry. The wood of the appletree or the common crab is hard, close-grained, and often richly colored, and is suitable for turning and cabinet work. The fermented juice of the crab is employed in cookery and medicine. Cider, the fermented juice of the apple, is a favorite drink in many portions of the U.S. The designation apple, with various modifying words, is applied to a number of fruits having nothing in common with the apple proper, as alligator-apple, love-apple, etc.

Apple of Discord, according to the story in the Greek mythology, the golden apple thrown into an assembly of the golds by the goldess of discord (Eris) bearing the inscription "for the fairest." Approditē (Venus). Hera (Juno), and Pallas (Minerva), became competitors for it, and its adjudication to the first by Paris so inflamed the jealousy and hatred of Hera to all of the Trojan race (to which Paris belonged) that she did not cease her machinations till Troy was destroyed.

Appleton, Outagamie co., Wis., on Fox River, 100 mi. n. of Milwaukee. Railroads: C. & N. W. (Wis. Division); C. & N. W. (Ashland Division); and C. M. & St. P. Industries: paper and pulp mills, flour mill, three iron foundries, two woolen mills, tile and sash and door factories, saw mills, planing mills, machine shops, knitting works, and bicycle works. Surrounding country agricultural. The town was first settled in 1848 and became a city in 1857. Pop. est. 1897, 16,000.

Appleton, CHARLES EDWARD (1841-1879), was born at Reading, and was educated at Oxford and in Germany. His reading was wide and varied, but he wrote little. He founded in 1869 the *Academy*, whose special feature is its signed articles. He died at Luxor, in Upper Egypt.

Appleton, DANIEL (1785-1849), the founder of the American publishing house of D. Appleton & Co., was born at Haverhill, Mass., where he commenced business as a retail trader. He settled as a bookseller in New York, and gradually built up one of the largest businesses of its kind in the U. S. He retired in 1848, leaving the business to four sons and their descendants. The firm published, 1857, the *New American Cyclopedia*, under the editorship of George Ripley and Charles A. Dana, which was completed in 1863. A new edition was published in 1872-76. The same firm has issued many scientific and educational works. Appomatt'ox Court-House, a village in Virginia, 20 mi. e. of Lynchburg. Here on April 9, 1865, General Lee surrendered to General Grant, and thus virtually concluded the Civil war.

Appropriation.—In the U. S. no money can be drawn from the Treasury but in consequence of appropriations made by law (Constitution, Art. I). Under this clause it is necessary for Congress to appropriate money for the support of the Federal government, and in payment of claims against it. In the House of Representatives appropriation bills have precedence.

Ap'ricot, a fruit of the plum genus which was introduced into Europe from Asia more than three centuries before Christ, and into England in the first half of the sixteenth century. It is a native of Armenia and other parts of Asia and also of Africa. The apricot is a low tree, of rather crooked growth, with somewhat heart-shaped leaves and sessile flowers. The fruit is sweet, more or less juicy, of a yellowish color, about the size of the peach, and resembling it in delicacy of flavor. The wood is coarsely grained and soft. Apricot-trees are chiefly raised against walls, and are propagated by budding and grafting.

A'pril ("to open," because the buds open at this time), the fourth month of the year. The strange custom of making fools on the 1st of April by sending people upon errands and expeditions which end in disappointment, and raise a laugh at the expense of the person sent, prevails throughout America. It has been connected with the miracle plays of the Middle Ages, in which the Saviour was represented as having been sent at this period of the year, from Annas to Caiaphas and from Pilate to Herod. In France the party fooled is called an April fish.

Apse, a portion of any building forming a termination or projection semicircular or polygonal in plan, and having a roof forming externally a semi-dome or semi-cone, or having ridges corresponding to the angles of the polygon; especially such a semi-circular or polygonal recess projecting from the east end of the choir or chancel of a church, in which the altar is placed. The apse was developed from the somewhat similar part of the Roman basilicæ, in which the magistrate sat.

Apsis (pl. Ap'sides or Apsi'des), in astronomy one of the two points of the orbit of a heavenly body situated at the extremities of the major axis of the ellipse formed by the orbit, one of the points being that at which the body is at its greatest, and the other that at which it is at its least, distance from its primary. In regard to the earth and the other planets, these two points correspond to the aphelion and perihelion; and in regard to the moon they correspond to the apogee and perigee. The line of the apsides has a slow, forward, angular motion in the plane of the planet's orbit, being retrograde only in Venus. This in the earth's orbit produces the anomalistic year.

9

Ap teryx, a nearly extinct genus of running birds, distinguished from the ostriches by having three toes with a rudimentary hallux, which forms a spur. They are natives of the south island

of New Zea-



land; are totally wingless and tailless, with feathers resembling hairs, about the size of a small goose, with long, curved beak something like that of a curlew. They are entirely nocturnal, feeding on insects, worms, and seeds. *Kiwi-kiwi*, from its cry, is the best known species.

**Apu' lia**, a department or division in the southeast of Italy, on the Adriatic, composed of the provinces of Foggia, Bari, and Lecce. Area 8,539 sq. mi.; pop. 1,587,713.

Aq'uamarine, a name given to some of the finest varieties of beryl of a sea green or blue color. Varieties of topaz are also so called.

Aqua'rium, a vessel or series of vessels constructed wholly or partly of glass and containing salt or fresh water in which are kept living specimens of marine or fresh-water animals along with aquatic plants. In principle the aquarium depends on the interdependence of animal and vegetable life; animals consuming oxygen and exhaling carbonic acid, plants reversing the process by absorbing carbonic acid and giving out oxygen. The aquarium must consequently be stocked both with plants and animals, and for the welfare of both something like a proper proportion should exist between them. The simplest form of aquarium is that of a glass vase; but aquariums on a larger scale consist of a tank or a number of tanks with plate-glass sides and stone floors, and contain sand and gravel, rocks, seaweeds, etc. By improved arrangements, light is admitted from above, passing through the water in the tanks and illuminating their contents, while the spectator is in comparative darkness. Aquariums on a large scale have been constructed in connection with public parks or gardens, and the name is also given to places of public entertainment in which large aquariums are exhibited. The largest aquarium in the world is at Castle Garden, N. Y. There are large aquaria at Brighton, Hamburg, and Paris. The Brighton Aquarium, which takes the lead, has forty-one tanks, containing all varieties of fish, from the stickleback to the sturgeon. Its area is 715 ft. in length by 100 ft. in breadth. There is one tank which con-tains 110,000 gallons of water, and has a plateglass front, through which the habits of very large fish may be studied. The Hamburg Aqua. rium is nearly the same size as that at Brighton

### Aqueduct

The Paris Aquarium, belonging to the French Acclimatization Society, is 50 yards in length by about 12 in breadth, and contains 40 tanks. Castle Garden, N. Y., has been transformed into an aquarium, and has 150 tanks for smaller fish, while there are gigantic tanks for sharks and other large and dangerous fish. There are fish in the Royal Aquarium at St. Petersburg that are known by record to have been there 140 years. Some of these fish have grown to be five times as large as when they were placed there, while others have not grown at all.

Aquarius, the water-bearer; a sign in the zodiac which the sun enters about January 21; so called from the rains which prevail at that season in Italy and the East.

Aquatint, a method of etching on copper by which a beautiful effect is produced, resembling a fine drawing in sepia or Indian ink. The special character of the effect is the result of sprinkling finely powdered resin or mastic over the plate, and causing this to adhere by heat, the design being previously etched or being now traced out. The nitric acid acts only in the interstices between the particles of resin or mastic, thus giving a slightly granular appearance.

Âq'ueduct, an artificial channel or conduit for the conveyance of water from one place to another; more particularly applied to structures for conveying water from distant sources for the supply of large cities. Aqueducts were extensively used by the Romans, and many of them still remain in different places on the continent of Europe, some being still in use. The Pont du Gard in the south of France, 14 mi. from Nismes, is still nearly perfect, and is a grand monument of the Roman occupation of that country. The ancient aqueducts were constructed of stone, or brick, sometimes tunneled through hills, and carried over valleys and rivers on arches. The Pont du Gard is built of great blocks of stone; its height is 160 ft.; length of the highest arcade, 882 ft. The aqueduct at Segovia, originally built by the Romans, has in some parts two tiers of arcades 100 ft. high, is 2,921 ft. in length, and is one of the most admired works of antiquity. One of the most remarkable aqueducts of modern times is that constructed by Louis XIV for conveying the waters of the Eure to Versailles. The extensive application of metal pipes has rendered the construction of aqueducts of the old type unnecessary; but what may be called aqueduct bridges are still frequently constructed in connection with water works for the supply of towns, and where canals exist, canal aqueducts are common, since the water in a canal must be kept on a perfect level. In the U.S. there are some important aqueducts, as the Croton, about 404 mi. long, bringing water to New York. The water is carried through 16 tunnels, the total length of which is 6,841 ft., cut through the gneiss rock. The open cutting is for the most part rock work. From the dam to Harlem River the aqueduct is of stone, brick, and cement, and has a capacity of 115 million gallons daily. The rate of flow is

14 miles per hour. There are two cast iron pipes two feet in diameter across the Harlem River, and over these one wrought iron pipe 74 ft. in diameter. What is called the high bridge, which is over 1,450 ft. long, with eight arches in the river and seven on the banks, supports the pipe. The two receiving reservoirs in Central Park cover 135 acres and have a capacity of 1,180,000,000 gallons. From these reservoirs the water is conveyed by two lines of pipe 30 inches in diameter, two of 36 inches, and one of 48 inches to the distributing reservoir.

The aqueduct or flume which conveys the water from the mountains to the reservoir at San Diego, Cal., is 35 mi. long and built almost wholly of redwood. It crosses 315 streams and cañons on trestles, the longest of which is 1,700 ft. and 85 ft. high. The timbers used in these trestles were put together on the ground and raised to their position by horse power. This aqueduct passes also through eight tunnels, the longest being 2,100 ft.

Aquila (ak wē-la), a town in Italy, capital of the province of Aquila, 55 mi. n.e. of Rome. In 1703 and 1706 it suffered severely from earthquakes. Pop. 14,720. The province has an area of 2,500 sq. mi.; a pop. of 371,332. Aquinas (a-kwī'nas), ST. THOMAS (1227-1274), a celebrated scholastic divine. He died

Aquinas (a-kwi'nas), Sr. THOMAS (1227-1274), a celebrated scholastic divine. He died on his way to Lyons to attend a general council for the purpose of uniting the Greek and Latin Churches. He was called, after the fashion of the times, the angelic doctor, and was canonized. The most important of his numerous works, which were all written in Latin, is the Summa Theologia.

Aquita' nia (later, Aquitaine), a Roman province in Gaul, which comprised the countries on the coast from the Garonne to the Pyrences, and from the sea to Toulouse. It was brought into connection with England by the marriage of Henry II with Eleanor, daughter of the last Duke of Aquitaine. The title to the province was for long disputed by England and France, but it was finally secured by the latter (1453).

Arabesque (ar'a-besk), a species of ornamentation for enriching flat surfaces, often consisting of fanciful figures, human or animal,



Arabesque.

combined with floral forms. There may be said to be three periods and distinctive varieties of arabesque: (a) the Roman or Græco-Roman, introduced into Rome from the East when pure art was declining; (b) the Arabesque of the Moors as seen in the Alhambra, introduced by them into Europe in the Middle Ages; (c) Modern Arabesque, which took its rise in Italy in the Renaissance period of art. The arabesques of the Moors, who are prohibited by their religion from representing animal forms, consist essentially of complicated ornamental designs based on the suggestion of plant-growth, combined with extremely complex geometrical forms.

Ara bl Pasha, Egyptian soldier and revolutionary leader, b. 1837. In September, 1881, he headed a military revolt, and was for a time virtually dictator of Egypt. Britain interfered, and after a short campaign, beginning with the bombardment of Alexandria and ending with the defeat of Arabi and his army at Telel-Kebir, he surrendered, and was banished to Ceylon.

Ara'bia, a vast peninsula in the s.w. of Asia, area rather over 1,000,000 sq. mi., its pop. probably not more than 5,000,000. Roughly described, it exhibits a central table-land surrounded by a series of deserts, with numerous scattered oases, while around this is a line of mountains parallel to and approaching the coasts, and with a narrow rim of low grounds between them and the sea. In its general features Arabia resembles the Sahara, of which it may be considered a continuation. Like the Sahara it has its wastes of loose sand, its mountains devoid of vegetation, its oases with their wells and streams, their palm-groves and cultivated fields. By the ancients the whole peninsula was broadly divided into three great sections: Arabia Petræa (containing the city Petra), Deserta (desert), and Felix (happy). The first and last of these answer roughly to the modern divisions of the region of Sinai in the n.w. and Yemen in the s.w., while the name Deserta was vaguely given to the rest of the country. The principal divisions at the present are Madian in the n.w.; south of this, Hejaz, Assir, and Yemen, all on the Red Sea, the last named occupying the southwestern part of the peninsula, and comprising a maritime lowland on the shores of the Red Sea, with an elevated inland district of considerable breadth; Hadramaut, on the south coast; Oman occupying the southeast angle; El-Hasa and Kovelt on the Persian Gulf; El-Hamad (Desert of Syria), Nefûd, and Jebel Shammar in the north; Nejd, the Central Highlands, which occupies a great part of the interior of the country, while south of it is the great unexplored Dahkna or sandy desert. Madian belongs to Egypt, the Hejaz, Yemen, Bahr-el-Hasa, Koveït, etc., are more or less under the suzerainty of Turkey. The rest of the country is ruled by independent chiefs, while the title of sultan has been assumed by the chief of the Wahabis in Nejd, the sovereign of Oman, and some petty princes in the south of the peninsula. The chief towns are: south of the peninsula. Mecca, the birthplace of Mohammed; Medina, the place to which he fled from Mecca (A. D. 622), and where he is buried; Mocha, a seaport celebrated for its coffee; Aden, on the s.w. coast, a strongly fortified garrison belonging to Britain; Sana, the capital of Yemen; and Muscat, the capital of Oman, a busy port





with a safe anchorage. The chief towns of the interior are Hall, the residence of the emir of Northern Nejd; Oneizah, under the same ruler; and Riad, capital of Southern Nejd. The most flourishing portions of Arabia are in Oman, Hadramaut, and Nejd. In the two former are localities with numerous towns and villages and settled industrious populations like that of Hindustan or Europe.

The climate of Arabia in general is marked by extreme heat and dryness. Aridity and barrenness characterize both high and low grounds, and the date-palm is often the only representative of vegetable existence. There are districts which in the course of the year are hardly refreshed by a single shower of rain. Forests there are few or none. Grassy pastures have their place supplied by steppe-like tracts. which are covered for a short season with aromatic herbs, serving as food for the cattle. The date-palm furnishes the staple article of food; the cereals are wheat, barley, maize, and millet; various sorts of fruit flourish; stances, such as gum-arabic, benzoin, mastic, balsam, aloes, myrrh, frankincense, etc., are produced. There are also cultivated in different parts of the peninsula, according to the soil and climate, beans, rice, lentils, tobacco, melons, saffron, colocynth, poppies, olives, etc. Sheep, goats, oxen, the horse, the camel, ass, and mule supply man's domestic and personal wants. Among wild animals are gazelles, ostriches, the lion, panther, hyena, jackal, etc. Among mineral products are saltpeter, mineral pitch, petroleum, salt, sulphur, and several precious stones, as the carnelian, agate, and onyx.

The Arabs, as a race, are of middle stature, of a powerful though slender build, and have a skin of a more or less brownish color; in towns and the uplands often almost white. Their features are well cut, the nose straight, the forehead high. They are naturally active, intelligent, and courteous; and their character is marked by temperance, bravery, and hospitality. The first religion of the Arabs, the worship of the stars, was supplanted by the doctrines of Mohammedanism, which succeeded rapidly in establishing itself throughout Arabia. Besides the two principal sects of Islam, the Sunnites and the Shiites, there also exists, in considerable numbers, a third Mohammedan sect, the Wahabis, which arose in the latter half of the eighteenth century, and for a time possessed great political importance in the peninsula. The mode of life of the Arabs is either nomadic or settled. The nomadic tribes are termed Bedouins, and among them are considered to be the Arabs of the purest blood. Commerce is largely in the hands of foreigners, among whom the Jews and Banians (Indian merchants) are the most numerous.

The history of the Arabs previous to Mohammed is obscure. The earliest inhabitants are believed to have been of the Semitic race. Jews in great numbers migrated into Arabia after the destruction of Jerusalem, and, mak-

ing numerous proselvtes, indirectly favored the introduction of the doctrines of Mohammed. With his advent the Arabians uprose and united for the purpose of extending the new creed; and under the caliphs - the successors of Mohammed — they attained great power, and founded large and powerful kingdoms in three continents. On the fall of the caliphate of Bagdad in 1258 the decline set in, and on the expulsion of the Moors from Spain the foreign rule of the Arabs came to an end. In the sixteenth century Turkey subjected Hejaz and Yemen, and received the nominal submission of the tribes inhabiting the rest of Arabia. The subjection of Hejaz has continued down to the present day; but Yemen achieved its independence in the seventeenth century, and maintained it till 1871, when the territory again fell into the hands of the Turks. In 1839 Aden was occupied by the British. Oman early became virtually independent of the caliphs, and grew into a well-organized kingdom. In 1507 its capital, Maskat, or Muscat, was occupied by the Portuguese, who were not driven out till 1659. The Wahabis appeared toward the end of the eighteenth century, and took an important part in the political affairs of Arabia, but their progress was interrupted by Mohammed Ali, pasha of Egypt, and they suffered a complete defeat by Ibrahim Pasha. He extended his power over most of the country, but the events of 1840 in Syria compelled him to renounce all claims to Arabia. The Hejaz thus again be-came subject to Turkish sway. Turkey has since extended its rule not only over Yemen, but also over the district of El-Hasa on the Persian Gulf.

The Arabic language belongs to the Semitic dialects, among which it is distinguished for its richness, softness, and high degree of de-velopment. By the spread of Islam it became the sole written language and the prevailing speech in all southwestern Asia and eastern and northern Africa, and for a time in southern Spain, in Malta, and in Sicily; and it is still used as a learned and sacred language wherever Islam is spread. Almost a third part of the Persian vocabulary consists of Arabic words, and there is the same proportion of Arabic in Turkish. The Arabic language is written in an alphabet of its own, which has also been adopted in writing Persian, Hindustani, Turkish, etc. As in all Semitic languages (except the Ethiopic), it is read from right to left. The vowels are usually omitted in Arabic manuscripts, only the consonants being written.

Before the time of Mohammed, poetical contests were held and prizes awarded for the best pieces. The collection called the *Moallukit* contains seven pre-Mohammedan poems by seven authors. Mohammed gave a new direction to Arab literature. The rules of faith and life which he laid down were collected by Abu-Bekr, first caliph after his death, and published by Othman, the third caliph, and constitute the *Koran*—the Mohammedan Bible. The progress of the Arabs in literature, the arts, and sciences, may be said to have begun with the government of the caliphs of the family of the Abbassides, A. D. 749, at Bagdad, several of whom, as Harun al Rashid and Al Mamun, were munificent patrons of learning; and their example was followed by the Ommiades in Spain. In Spain important works were written on geography, history, philosophy, medicine, physics, mathematics, arithmetic, geometry, and astronomy. Most of the geography in the Middle Ages is the work of the Arabians, and their historians since the eighth century have been very numerous. The philosophy of the Arabians was of Greek origin, and derived principally from that of Aristotle. Of their philosophical authors the most celebrated are Alfarabi (tenth century), Ibn Sina or Avicenna (d. A. D. 1037), Alghazzali (d. 1111) Ibn Roshd or Averroes (twelfth century), called by pre-eminence, The Commentator. In medicine they excelled all other nations in the Middle Ages, and they are commonly regarded as the earliest experimenters in chemistry. Their mathematics and astron-omy were based on the works of Greek writers, but the former they enriched, simplified, and extended. It was by them that algebra (a name of Arabic origin) was in-troduced to the Western peoples, and the Arabic numerals were similarly introduced. Astronomy they especially cultivated, and observatories were erected at Bagdad and Cordova. The Almagest of Ptolemy, in an Arabic translation, was early a text-book among them. Among poets were Abu Nowas, Asmai, Abu Temmam, Motenabbi, Abul-Ala, Busiri, Tograi, and Hariri. Tales and romances in prose and verse were written. The tales of fairies, genii, enchanters, and sorcerers in particular, passed from the Arabians to the Western nations, as in The Thousand and One Nights. At the present day Arabic literature is almost confined to the production of com-mentaries and scholia, discussions on points of dogma and jurisprudence, and grammatical works on the classical language. There are a few newspapers published in Arabic. Arabian Nights (or The Thousand and One

Nights), a celebrated collection of Eastern tales, long current in the East, and supposed to have been derived by the Arabians from India, through the medium of Persia. They were first introduced into Europe in the beginning of the eighteenth century by means of the French translation of Antoine Galland. Of some of them no original MS. is known to exist; they were taken down by Galland from the oral communication of a Syrian friend. The story which connects the tales of The Thousand and One Nights is as follows: The Sultan Shahriyar, exasperated by the faithlessness of his bride, made a law that every one of his future wives should be put to death the morning after marriage. At length one of them, Shahrazad, the generous daughter of the grand-vizier, succeeded in abolishing the cruel custom. By the charm of her stories the fair narrator induced the sultan to defer her execution every day till the dawn of another, by breaking off in the middle of an interesting tale which she had begun to relate. In the form we possess them these tales belong to a comparatively late period, though the exact date of their composition is not known. Lane, who published a translation of a number of the tales, with valuable notes, is of the opinion that they took their present form some time between 1475 and 1525. Two complete English translations have recently been printed, giving many passages that previous translators had omitted on the score of morality or decency.

Arabian Sea, the part of the Indian Ocean between Arabia and India.

**Arabic Figures**, the characters 1, 2, 3, 4, 5, 6, 7, 8, 9, 0; of Indian origin, introduced into Europe by the Moors. They did not come into general use till after the invention of printing.

Aracan (ar-a-kan'), the most northern division of Lower Burmah, on the Bay of Bengal; Area 14,520 sq. mi.; pop. 587,518. Ceded to the English in 1826, as a result of the first Burmese war.

Arachis (ar'a-kis), a genus of leguminous plants much cultivated in warm climates, and esteemed a valuable article of food. The most remarkable feature of the genus is that when the flower falls the stalk supporting the small, undeveloped fruit lengthens, and bending toward the ground pushes the fruit into the ground, when it begins to enlarge and ripen. The pod of arachis (popularly called ground, earth-, or pea-nut) is of a pale yellow color, and contains two seeds the size of a hazel-nut, in flavor sweet as almonds, and yields when pressed an excellent oil. See *Peanut*.

Arachnida (a-rak' ni-da), a class of animals, including the spiders, scorpions, mites, ticks, etc. They have the body divided into a number of segments or *somites*, some of which have always articulated appendages (limbs, etc.).

always articulated appendages (limbs, etc.). Arad (órod), a town of Hungary, on the Maros, 30 mi. n. of Temeswar, divided by the river into O (Old) Arad and Uj (New) Arad, connected by a bridge; it has a fortress, and is an important railway center, with a large trade and manufactures. Pop. Old Arad, 35,556; New Arad, 5,141.

Arafat' (or Jebel er Rahmeh) ("Mountain of Mercy"), a hill in Arabia, about 200 ft. high, with stone steps reaching to the summit, 15 mi. s. e. of Mecca; one of the principal objects of pilgrimage among Mohammedans, who say that it was the place where Adam first received his wife Eve, after they had been expelled from Paradise and separated from each other 120 years. A sermon delivered on the mount constitutes the main ceremony of the Hadj or pilgrimage to Mecca, and entitles the hearer to the name and privileges of a Hadji, or pilgrim.

Ar'ago, DOMINIQUE FRANCOIS (1786-1853), a celebrated French scientist and statesman; was an investigator especially in physics and astronomy, made important discoveries in magnetism and optics, and was a skilful

#### Aragon

popular writer on these subjects. As a statesman he is famous as a close friend of Napoleon the Great, and later as a champion of republican institutions and liberties. Arago graduated from the polytechnic school in 1805, and was appointed to a commission which was making certain measurements of longitude that were to serve as the basis of a decimal metric system. While engaged in this work he was taken prisoner as a spy by the Spaniards (1808), underwent hardships and narrow escapes, but finally reached Marseilles, 1809. Arrived at Paris, he was at once elected a member of the Institute, though only 23 years old, was appointed a professor at the polytechnic school, and in 1830 became perpetual secretary of the Academy of Sciences and director of the observatory. These offices he retained until his death. He rendered great service to the science of optics, and made valuable contributions to meteorology, especially in con-nection with electricity. In 1829 Arago re-ceived the Copley medal from the London Royal Society, being the first Frenchman to be awarded that honor. Napoleon in-vited Arago to accompany him to the U.S., whither he thought of coming after Waterloo, to devote the rest of his life to scientific pursuits. Arago was urged to accompany him to St. Helena, but refused. In the Revolution of 1830, Arago supported the cause of the people. He was elected a member of the Chamber of Deputies in 1831, and there made many famous speeches, in behalf of education, science, and especially the rights of the people. He opposed the government mo-nopoly of railways. Arago was president of the Council General of the Seine until 1849, and was the chief instrument in the emancipation of slaves. He was active in the over-throw of Louis Philippe, 1848, was a member of the provisional government and afterward

minister of war and marine. As a member of the executive commission he displayed great courage in the Revolution of 1848. He favored liberal institutions as exemplified in the U.S. He opposed the election of Louis Napoleon to the presidency, and after the *coup d'état* of 1857, refused to take oath to his government, remaining true to his republican principles. The last three years of his life he was blind. Arago was the author of about sixty scientific works and memoirs.

Aragon', kingdom of, a former province or kingdom of Spain, now divided into the three provinces of Teruel, Huesca, and Saragossa. Area 14,726 sq. mi. It was governed by its own monarchs until the union with Castile on the marriage of Ferdinand and Isabella (1469). Pop. 909,261.

Araguaya (à-rà-gwl'à), a Brazilian river, length, about 1,300 mi., of which over 1,000 are navigable.

A'ral, a salt-water lake in Asia, in Russian territory, about 150 mi. west of the Caspian Sea. Area 26,650 sq. mi. It receives the Amoo Daria or Oxus and the SIr Daria or Jaxartes, and contains a multitude of sturgeon

### Araucanians

and other fish. It has no outlet. The Aral contains a large number of small islands; steamers have been placed on it by the Russians.

Aramæ'an (or Aramaic), a Semitic language nearly allied to the Hebrew and Phœnician, anciently spoken in Syria and Palestine and eastward to the Euphrates and Tigris, being the official language of this region under the Persian domination. In Palestine it supplanted Hebrew, and it was it and not the latter that was the tongue of the Jews in the time of Christ. Parts of Daniel and Ezra are written in Aramaic, or, as this form of it is often incorrectly named, Chaldee, from an old notion that the Jews brought it from Babylon. An important Aramaic dialect is the Syriac, in which there is an extensive Christian literature.

Aranjuez ( $\dot{a}$ -r $\dot{a}$ n- $\dot{h}u$ -eth'), a small town and palace in Spain, 30 mi. from Madrid, with splendid gardens laid out by Philip II. The court used to reside here from Easter till the close of June, when the number of people increased from 4,000 to about 20,000.

**Arap'ahocs**, a tribe of American Indians once located near the head-waters of the Arkansas and Platte rivers, not now of any importance. The survivors are located in the Indian Territory.

Ar'arat, a celebrated mountain in Armenia, forming the point of contact of Russia with Turkey and Persia; an isolated volcanic mass showing two separate cones known as the Great and Little Ararat, resting on a common base and separated by a deep intervening depression. The elevations are: Great Ararat, 18,916 feet; Little Ararat, 12,840 feet; the connecting ridge, 8,780 feet. Vegetation extends to 14,200 feet, which marks the snow-line. According to tradition Mount Ararat was the resting-place of the ark when the waters of the flood abated.



Araucanians.

Arauca'nians, a South American native race in the southern part of Chile. They are warlike and more civilized than many of the

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1

#### Araucaria

native races of S. America, and maintained almost unceasing war with the Spaniards from 1537 to 1773, when their independence was recognized by Spain, though their territory was much curtailed. Their early contests with the Spaniards were celebrated in Ercilla's Spanish poem Araucana. With the republic of Chile they were long at feud, and latterly had at their head a French adventurer named Tonneins, who claimed the title of king. In 1882 they submitted to Chile. The Chilean province of Arauco receives its name from them.

Arauca'ria, a genus of trees of the coniferous or pine order, belonging to the southern hemisphere. The species are large evergreen trees with pretty large, stiff, flattened, and generally imbricated leaves, verticillate spreading branches, and bearing large cones, each scale having a single large seed. Its seeds are eaten when roasted. The Moreton Bay pine, of N. S. Wales supplies a valuable timber used in house and boat building, in making furniture, and in other carpenter work. Another species, the Norfolk Island pine, abounds in several of the South Sea Islands, where it attains a height of 220 feet with a circumference of 30 feet and is described as one of the most beautiful of trees. Its foliage is light and graceful, and quite unlike that of the Chile pine, having nothing of its stiff formality. Its timber is of some value, being white, tough, and close-grained.

Arau'co, a province of Chile, named from the Araucanian Indians. Area 4,246 sq. mi.; pop. 73,658; capital, Lebu.

pop. 73,658; capital, Lebu. Ar'baces, one of the generals of Sardanapälus, king of Assyria. He revolted and defeated his master, and became the founder of the Median Empire 846 B. c.

Arbe'la (now Erbil), a place in the Turkish vilayet of Bagdad, giving name to the decisive battle fought by Alexander the Great against Darius, at Gaugamela, about 20 mi. distant from it, Oct. 1, B. c. 331.

Arbitra'tion, the hearing and determination of a cause between parties in controversy, by a person or persons chosen by the parties. This may be done by one person, but it is common to choose more than one. Frequently two are nominated, one by each party, with a third, the *umpire*, who is called on to decide in case of the primary arbitrators differing. In such a case the umpire may be agreed upon either by the parties themselves, or by the arbitrators, when they have received authority from the parties to the dispute to settle this The determination of arbitrators is point. called an award. The disputes of nations were formerly arbitrated only by war, but in this regard the U.S. has set a high example to the world by repeatedly inviting arbitration in international disputes. Her notable triumphs in this respect include the Alabama, Bering Sea, and Venezuela boundary disputes.

**Arbor Day**, a day designated by legislative enactment, in the different states, for the voluntary planting of trees by the people; the pupils in the public schools now take part in

#### Arcade

the observance of the day. It was inaugurated in 1874 by the Nebraska state board of agriculture at the suggestion of Julius Sterling Morton, afterwards secretary of agriculture in President Cleveland's second administration. Nearly every one of the states has already established an annual Arbor Day, and observes it as a legal holiday.

Arbor Vitæ ("tree of life"), the name of several coniferous trees, allied to the cypress, with flattened branchlets, and small imbricated or scale-like leaves. The common Arbor Vitæ is a native of N. America, where it grows to the height of 40 or 50 feet. The young twigs have an agreeable balsamic smell. The Chinese Arbor Vitæ, common in Britain, yields a resin which was formerly thought to have medicinal virtues.

**Ar' butus,** a genus of plants belonging to the heath order, and comprising a number of small trees and shrubs, natives chiefly of Europe and N. America.



Arbutus. a.-fruit: b.-section of fruit.

The trailing arbutus or May-flower of N. America, a plant with fragrant and beautiful blossoms, is of the same natural order.

Arcade, a series of arches supported on piers or pillars, used generally as a screen and support of a roof, or of the wall of a building, and having beneath the covered part an ambulatory as round a cloister, or a footpath with shops or dwellings, as frequently seen in old Italian towns. Sometimes a porch or other prominent part of an important building is treated with arcades.

At the present day Bologna, Padua, and Berne have fine examples of mediæval arcaded streets, and among more modern work various streets in Turin, and the Rue de Rivoli, Paris, are lined with arcades, with shops underneath. In mediæval architecture the term arcade is also applied to a series of arches supported on pillars forming an ornamental dressing or enrichment of a wall, a mode of treatment of very frequent occurrence in the towers, apses, and other parts of churches. In modern use the name arcade is often applied to a passage

or narrow street containing shops arched over and covered with glass; as for example, the Burlington Arcade, London, and the Galleria Vittorio Emmanuele, in Milan.

Arca dia, the central and most mountainous portion of the Peloponnesus (Morea), the inhabitants of which in ancient times were celebrated for simplicity of character and manners. Their occupation was almost entirely pastoral, and thus the country came to be regarded as typical of rural simplicity and happiness. At the present day Arcadia forms a nomarchy of the kingdom of Greece. Area 2,028 sq. mi.; pop. 148,600.

Arch, a structure composed of separate pieces, such as stones or bricks, having the shape of truncated wedges, arranged on a curved line, so as to retain their position by mutual pressure. The separate stones which compose the curve of



compose the curve of an arch are called *ous*soirs or arch-stones; the extreme or lowest voussoirs are termed springers, and the uppermost or central one is called the keystone. The under or concave side of the voussoirs is called the *intrados*, and the upper or convex side the *extrados*, of the arch. The supports which af-

ford resting and resisting points to the arch are called *piers* and *abutments*. The upper part of the pier or abutment where the arch rests -technically where it springs from—is the impost. The span of an arch is in circular arches the length of its chord, and generally the width between the points of its opposite imposts whence it springs. The rise of an arch is the height of the highest point of its intrados above the line of the imposts; this point is sometimes called the under side of the crown, the highest point of the extrados being the croten. Arches are designated in various ways, as from their shape (circular, elliptic, etc.), or from the resemblance of the whole contour of the curve to some familiar object (lancet arch, horse-shoe arch), or from the method used in describing the curve, as equilateral, three-centered, four-centered, ogee, and the like; or from the style of architecture to which they belong, as Roman, pointed, and Saracenic arches. Triumphal arch, originally a simple decorated arch under which a victorious Roman general and army passed in triumph. At a later period the triumphal arch was a richly sculptured, massive, and permanent structure, having an archway passing through it, with generally a smaller arch on either side. The name is sometimes given to an arch, generally of wood decorated with flowers or evergreens, erected on occasion of some public rejoicing, etc.

Archeol'ogy, the science which takes cognizance of the history of nations and peoples as evlnced by the remains, architectural, implemental, or otherwise, which belong to the

earlier epoch of their existence. In a more extended sense the term embraces every branch of knowledge which bears on the origin, religion, laws, language, science, arts, and literature of ancient peoples. It is to a great extent synonymous with *prehistoric annals*, as a large if not the principal part of its field of study extends over those periods in the history of the human race in regard to which we possess almost no information derivable from written records. Archæology divides the primeval period of the human race, more especially as exhibited by remains found in Europe, into the Stone, the Bronze, and the Iron Age, these names being given in accordance with the materials employed for weapons, implements, etc., during the particular period. The Stone Age has been subdivided into the Palæolithic and Neolithic, the former being that older period in which the stone implements were not polished as they are in the latter and more recent period. The Bronze Age, which admits of a similar subdivision, is that in which implements were of copper or bronze. In this age the dead were burned and their ashes deposited in urns or stone chests, covered with conical mounds of earth or cairns of stones. Gold and amber ornaments appear in this age. The Iron Age is that in which im-plements, etc., of iron begin to appear, although stone and bronze implements are found along with them. The word age in this sense (as explained under Age) simply denotes the stage at which a people has arrived. The phrase "Stone Age," therefore, merely marks the period before the use of bronze, the "Bronze Age" that before the employment of iron, among any specific people.

Archangel (ärk-an'jel), a seaport, capital of the Russian government of same name, on the right bank of the northern Dwina, about 20 mi. above its mouth in the White Sea. The place has some manufactures and an important trade, exporting linseed, flax, tow, tallow, train-oil, mats, timber, pitch and tar, etc. The port is closed for six months by ice. Archangel, founded in 1584, was long the only port which Russia possessed. Pop. 10,540. The province has an area of 331,400, sq. mi. Pop. 311,673.

Årchelaus (år-kē-lā'us), the name of several personages in ancient history, one of whom was the son of Herod the Great. He received from Augustus the sovereignty of Judea, Samaria, and Idumea. The people, tired of his tyrannical and bloody reign, accused him before Augustus, who banished him to Gaul.

Archer-fish, a name given to a scaly-finned fish, about 6 inches long, inhabiting the seas around Java, which has the faculty of shooting drops of water to the distance of 3 or 4 feet at insects, thereby causing them to fall into the water, when it seizes and devours them. The soft, and even the spiny portion of their dorsal fins are so covered with scales as to be scarcely distinguishable from the rest of the body.

Arch'ery, the art of shooting with a bow and arrow. The use of these weapons in war



### Archimedean Screw



Archer Fish.

and the chase dates from the earliest antiquity. Ishmael, we learn from Genesis 21, "became an archer." The Egyptians, Assyrians, Persians, and Parthians excelled in the use of the bow; and while the Greeks and Romans themselves made little use of it they employed foreign archers as mercenaries. Coming to much more recent times we find the American Indians exceedingly skilful archers. The Swiss archers generally use the arbalist or cross-bow. The English victories of Crécy, Poitiers, and Agincourt may be ascribed to the bowmen. Archery disappeared gradually as firearms came into use, and as an instrument of war or the chase the bow is now confined to the most savage tribes of both hemispheres. But though the bow has been long abandoned among civilized nations as a military weapon, it is still cherished as an instrument of healthful recreation. In recent years a number of archery clubs have been formed in the U.S. Archery has the merit of forming a sport open to women as well as men.

Archime' dean Screw, a machine for raising water, said to have been invented by Archimedes, during his stay in Egypt, for irrigating the land. It is formed by winding a tube spirally round a cylinder so as to have



Archimedean Screw.

the form of a screw, or by hollowing out the cylinder itself into a double or triple threaded screw and inclosing it in a water-tight case. When the screw is placed in an inclined position and the lower end immersed in water, by

### Architecture

causing the screw to revolve, the water may be raised to a limited extent.

Archimedes (år-ki-me'döz), a celebrated ancient Greek physicist and geometrician, born at Syracuse, in Sicily, about 287 B. c. He devoted himself entirely to science, and enriched mathematics with discoveries of the highest importance, upon which the moderns have founded their admeasurements of curvilinear surfaces and solids. Archimedes is the only one among the ancients who has left us anything satisfactory on the theory of mechanics and on hydrostatics. He first taught the hydrostatic principle to which his name is attached, "that a body immersed in a fluid loses as much in weight as the weight of an equal volume of the fluid," and de-termined by means of it that an artist had fraudulently added too much alloy to a crown which King Hiero had ordered to be made of pure gold. He discovered the solution of this problem while bathing; and it is said to have caused him so much joy that he hastened home from the bath undressed, and crying out, Eureka! Eureka! "I have found it, I have found it!" Practical mechanics also received a great deal of attention from Archimedes, who boasted that if he had a fulcrum or standpoint he could move the world. He is the inventor of the compound pulley, probably of the endless screw, the Archimedean screw, etc. During the siege of Syracuse by the Romans he is said to have constructed many wonderful machines with which he repelled their attacks, and he is stated to have set on fire their fleet by burning-glasses! At the moment when the Romans gained possession of the city by assault (212 B. C.) tradition relates that Archimedes was slain while sitting in the market-place contemplating some mathematical figures which he had drawn in the sand.

Architec'ture, in a general sense, is the art of designing and constructing houses, bridges, and other buildings for the purposes of civil life; or, that branch of the fine arts which has for its object the production of edifices not only convenient but characterized by unity, beauty, and grandeur. The first habitations of man were caves, huts, and tents. But as soon as men rose in civilization they began to build more commodious and comfortable habitations. They prepared bricks of clay or earth, which they at first dried in the air, but afterward baked by fire; and latterly they smoothed stones and joined them with mortar or cement. After they had learned to build houses, they erected temples for their gods on a larger and more splendid scale than their own dwellings. The Egyptians are the most ancient nation known to us among whom architecture had attained the character of a fine art. Other ancient peoples among whom it had made great progress were the Babylonians, whose most celebrated buildings were temples, palaces, and hanging-gardens; the Assyrians, whose capital, Nineyeh, was rich in splendid buildings; the Phænicians, whose cities, Sidon, Tyre,

# Architecture

etc., were adorned with equal magnificence; and the Israelites, whose temple was a wonder of architecture. But comparatively few architectural monuments of these latter nations have remained till our day. This is not the case with the architecture of Egypt, however, of which we possess ample remains in the shape of pyramids, temples, sepulchres, obe-lisks, etc. The Egyptian temples had walls of great thickness and sloping on the outside from bottom to top; the roofs were flat, and composed of blocks of stone reaching from one wall or column to another. The principle of the arch was not employed for architectural purposes. Statues of enormous size, sphinxes carved in stone, and on the walls sculptures in outline of deities and animals, with innumerable hieroglyphics, are the decorative objects which belong to this style. In historic times the Greeks developed an architecture of noble simplicity and dignity, in part derived from the Egyptian. It is considered to have attained its greatest perfection in the age of Pericles, or about 460-430 B. c. The great masters of this period were Phidias, Ictinus, Callicrates, etc. All the extant buildings are more or less in ruins. The style is characterized by beauty, harmony, and simplicity in the highest degree. The Greeks had three orders, called respectively the Doric, Ionic, and Corinthian. See articles under these names. Greek buildings were abundantly adorned with sculptures, and painting was extensively used, the details of the structures being enriched by different colors or tints. Lowness of roofs and the absence of arches were distinctive features of Greek architecture. The most remarkable public edifices of the Greeks were temples, of which the most famous is the Parthenon at Athens. Their theaters were semicircular on one side and square on the other, the semicircular part being usually excavated in the side of some convenient hill. This part, the auditorium, was filled with concentric seats, and might be capable of containing 20,000 spectators. A number exist in Greece, Sicily, and Asia Minor, and elsewhere. After the death of Alexander the Great (323) the decline was very marked. The Romans early took the foremost place in the construction of such works as aqueducts and sewers, the arch being in extensive use among this people. As a fine art, Roman architecture had its origin in copies of the Greek models. Their number, moreover, was augmented by the addition of two new orders—the Tuscan and the Composite. Rome attained, under Augustus, its greatest perfection in architecture. Among the great works now erected were temples, aqueducts, amphitheaters, magnificent villas, triumphal arches, monumental pillars, etc. The amphitheater differed from the theater in being a completely circular or rather elliptical building, filled on all sides with ascending seats for spectators and leaving only the central space, called the arena, for the combatants and public shows. The Coliseum is a stupendous structure of this kind. The therma, or baths, were vast structures in which multitudes of people could bathe at once. The excavations at Pompeii in particular have thrown great light on the internal arrangements of the Roman dwellinghouse. After the period of Hadrian (117-138 A. D.) Roman architecture is considered to have been on the decline. In Constantinople, after its virtual separation from the Western Empire, arose a style of art and architecture which was practised by the Greek Church during the whole of the Middle Ages. This is called the Byzantine style. The church of St. Sophia at Constantinople, built by Justinian (reigned 527-565), offers the most typical specimen of the style, of which the fundamental principle was an application of the Roman arch, the dome being the most striking feature of the building. In the most typical examples the dome or cupola rests on four pendentives.

the dome or cupola rests on four pendentives. After the dismemberment of the Roman Empire the beautiful works of ancient architecture were almost entirely destroyed by the Goths, Vandals, and other barba-rians in Italy, Greece, Asia, Spain, and Africa; or what was spared by them was ruined by the fanaticism of the Christians. A new style of architecture now arose, two forms of which, the Lombard and the Norman-Romanesque, form important phases of art. The Lombard prevailed in north Italy and south Germany from the eighth or ninth to the thirteenth century (though the Lombard rule came to an end in 774). The semicircular arch is the characteristic feature of the Norman-Romanesque style, which flourished in England from the eleventh to the middle of the thirteenth century. With the Lombard-Romanesque were combined Byzantine features, and buildings in the pure Byzantine style were also erected in Italy, as the Church of St. Mark at Venice.

The conquests of the Moors introduced a fresh style of architecture into Europe after the eighth century—the Moorish or Saracenic. The edifices erected by the Moors and Saracens in Spain, Egypt, and Turkey, are distinguished, among other things, by a peculiar form of the arch, which forms a curve constituting more than half a circle or ellipse. A peculiar flowery decoration, called *arabesque*, is a common ornament of this style, of which the building called the Alhambra is perhaps the chief glory.

The Germans were unacquainted with architecture until the time of Charlemagne (or Charles the Great, 742-814). He introduced into Germany the Byzantine and Romanesque styles. Afterward the Moorish or Arabian style had some influence upon that of the Western nations, and thus originated the mixed style which maintained itself till the middle of the thirteenth century. Then began the modern Gothic style, which grew up in France, England, and Germany. Its striking characteristics are its pointed arches, its pinnacles and spires, its large buttresses, clustered pillars, vaulted roofs, profusion of ornament, and, on the whole, its

### Architecture

lofty, bold character. Its most distinctive feature, as compared with the Greek or the Egyptian style, is the predominance in it of perpendicular or rising lines, producing forms that convey the idea of soaring or mounting upward. Its greatest capabilities have been best displayed in ecclesi-astical edifices. The Gothic style is divided into four principal epochs: The Early Pointed, or general style of the thirteenth century; the Decorated, or style of the fourteenth century; the Perpendicular, prac-tised during the fifteenth and early part of the sixteenth centuries; and the Tudor, or general style of the sixteenth century. This style lasted in England up to the seventeenth century, being gradually dis-placed by that branch of the Renaissance or modified revival of ancient Roman architecture which is known as the Elizabethan style, and which is perhaps more purely an English style than any other that can be named. The rise of the Renaissance style in Italy is the greatest event in the history of architecture after the introduction of the Gothic The Gothic style had been introstyle. duced into the country and extensively em-ployed, but had never been thoroughly naturalized. The Renaissance is a revival of the classic style based on the study of the ancient models; and having practically commenced in Florence about the beginning of the fifteenth century, it soon spread with great rapidity over Italy, and the greater part of Europe. The most illustrious architects of this early period of the style were Brunelleschi, who built at Florence the dome of the cathedral, the Pitti Palace, etc., besides many edifices at Milan, Pisa, Pesaro, and Mantua; Alberti, who wrote an im-portant work on architecture, and erected many admired churches; Bramante, who began the building of St. Peter's, Rome; and Michael Angelo, who erected its magnificent dome. On St. Peter's were also employed Raphael, Peruzzi, and San Gallo.

Since the Renaissance period there has been no architectural development requiring special note. In edifices erected at the present day some one of the various styles of architecture is employed according to taste. Modern dwell-ing-houses have necessarily a style of their own as far as stories, and apartments, and windows, and chimneys can give them one. In general the Grecian style, as handed down by Rome, and modified by the Italian architects of the Renaissance, from its right angles and straight entablatures, is more convenient, and fits better with the distribution of our common edifices, than the pointed and irregu-lar Gothic. But the occasional introduction of the Gothic outline and the partial employment of its ornaments has undoubtedly an agreeable effect, both in public and private edifices; and we are indebted to it, among other things, for the spire, a structure exclusively Gothic, which, though often misplaced, has become an object of general approbation, and a pleasing landmark to cities and villages.

# Architecture

The works most characteristic of the present day are the grand bridges, viaducts, etc., in many of which iron is the sole or most characteristic portion of the material. The U. S., Canada, and the Australian colonies have not been backward in following the lead of the older countries of Europe. In America the increase in the number of handsome buildings has been very noteworthy since the termination of the Civil War, and the architectural accomplishments of the World's Columbian Exposition at Chicago, in 1893, have never been excelled in any country.

A new era has dawned in the construction of high buildings. "Chicago construction" is a term applied to the new method of building high structures, having a steel frame skeleton, starting with the foundation and built up complete like a bridge. This method originated in Chicago. Each floor is absolutely independent so far as the walls and partitions are concerned, for the walls have nothing but their own weight to carry in the height of each story. The contractor may begin exterior work on the third, fifth, or any story he pleases, and leave the first to be enclosed after every other floor has been walled in and plastered. The steel framework is put up as rapidly as possible so as to get the roof on to protect the interior from the weather. Then the hollow tile partitions or the walls are built in as desired. This method of building ignores the massive foundations, heavy piers, the use of thick walls, and solid partition walls, running from the foundation to the roof. In this system, the columns, starting from the foundations, can carry the floors as well as partitions and thus permit any arrangement of a floor without interfering with the construction. The demand for high buildings set the architects to work to solve the problem of overcoming the instability of the original soil of Chicago. In Chicago construction the foundations are made of steel railroad rails, or "I" beams. First a bed of concrete is laid, and on this is placed a layer of rails, or beams placed side by side. On this bottom layer another layer of rails or beams is laid, crossing the lower members of the foundation at right angles. On top of the rails a cast iron plate is laid. This is the shoe for the steel The column is always made of column. wrought steel, and is of the same size for each of two stories, diminishing in size as it nears the roof. The entire framework is riveted together with hot rivets. Every piece of exposed steel work is completely surrounded with some fire-proof material, such as blocks of tile or brick.

A few words may be added on the architecture of India and China. Although many widely differing styles are to be found in India, the oldest and only true native style of Indian ecclesiastical architecture is the Buddhist, the earliest specimens dating to 250 B. c. Among the chief objects of Buddhist art are stupas or topes, built in the form of large towers, and employed as digobas to contain relics of Buddha or of some noted saint. Other works

of Buddhist art are temples or monasteries excavated from the solid rock, and supported by pillars of the natural rock left in their places. Buddhist architecture is found in Ceylon, Thibet, Java, etc., as well as in India. The most remarkable Hindu or Brahmanical temples are in southern India. They are pyramidal in form, rising in a series of stories. The Saracenic or Mohammedan architecture latterly introduced into India is of course of foreign origin. The Chinese have made the tent the elementary feature of their architecture; and of their style any one may form an idea by inspecting the figures which are depicted upon common chinaware. Chinese roofs are concave on the upper side, as if made of canvas instead of wood. (For further information on the different subjects pertaining to architecture see separate articles on the different styles, Greek, Roman, Gothic, etc., and such entries as Arch, Column, Aqueduct, Corinthian, Doric, Ionic, Theater).

Archytas (ar-k1' tas), an ancient Greek mathematician, statesman, and general, who flourished about 400 B. c., and belonged to Tarentum in southern Italy. The invention of the analytic method in mathematics is ascribed to him, as well as the solution of many geometrical and mechanical problems. He constructed various machines and automata, among which was his flying pigeon. He was a Pythagorean in philosophy, and Plato and Aristotle are said to have been both deeply indebted to him. Only inconsiderable fragments of his works are extant.

Arcis-sur-Aube (ar-sē-sur-öb), a small town of France, dep. Aube, at which, in 1814, was fought a battle between Napoleon and the allies, after which the latter marched to Paris. Pop. 2,928.

Arc-light, that species of the electric light in which the illuminating source is the current of electricity passing between two sticks of carbon kept a short distance apart, one of them being in connection with the positive, the other with the negative terminal of a battery or dynamo.

**Arcole** (ar'ko-lā), a village in north Italy, 15 mi. s. e. of Verona, celebrated for the battles of Nov. 15, 16, and 17, 1796, fought between the French under Bonaparte and the Austrians, in which the latter were defeated with great slaughter.

Ar cot, two districts and a town of India, within the Presidency of Madras.—NORTH ARCOT is an inland district with an area of 7,256 sq. mi. The country is partly flat and partly mountainous, where intersected by the eastern Gháts. Pop. 1,817,814.—SOUTH ARCOT lies on the Bay of Bengal, and has two seaports, Cuddalor and Porto Novo. Pop. 1,814,738.— The town Arcot is in north Arcot, on the Palar, about 70 mi. w. by s. of Madras. There is a military cantonment at 3 miles' distance. Pop. 12,000.

Arctic (ark'tik), an epithet given to the north pole from the proximity of the constellation of the Bear, in Greek called *arktos*. The Arctic Circle is an imaginary circle on the globe, parallel to the equator, and 23° 28' distant from the north pole. This and its opposite, the *Antarctic*, are called the two polar circles.

Arctic Ocean, that part of the water surface of the earth which surrounds the north pole, and washes the northern shores of Europe, Asia, and America; its southern boundary roughly coinciding with the Arctic Circle. It incloses many large islands, and contains large bays and gulfs which deeply indent the northern shores of the three continents. Its great characteristic is ice, which is nearly constant everywhere.

Arctic Regions, the regions around the north pole, and extending from the pole on all sides to the Arctic Circle. The Arctic or North Polar Circle just touches the northern headlands of Iceland, cuts off the southern and narrowest portion of Greenland, crosses Fox's Strait north of Hudson's Bay, whence it goes over the American continent to Bering's Strait. Thence it runs to Obdorsk at the mouth of the Obi, then crossing northern Russia, the White Sea, and the Scandinavian Peninsula, returns to Iceland. Though much skill and heroism have been developed in the exploration of this portion of the earth, there is still an area round the pole estimated at 2,500,000 sq. mi., which is a blank to geographers. Many have adopted the belief in the existence of an open polar sea about the north pole; but this belief is not supported by any positive evidence. Valuable minerals, fossils, etc., have been discovered within the Arctic regions. In the archipelago north of the American continent excellent coal frequently occurs. The min-eral cryolite is mined in Greenland. Fossil ivory is obtained in the islands at the mouth of the Lena. In Scandinavia, parts of Siberia, and northwest America, the forest region extends within the Arctic Circle. The most characteristic of the natives of the Arctic regions are the Esquimaux. The most notable animals are the white-bear, the musk-ox, the reindeer, and the whalebone whale. Fur-bearing animals are numerous. The most intense cold ever registered in those regions was  $74^{\circ}$  below zero F. The aurora borealis is a brilliant phenomenon of Arctic nights.

Arctu'rus, a fixed star of the first magnitude in the constellation of Boötes, and thought by some to be the nearest to our system of any of the fixed stars. It is one of the stars observed to have a motion of its own, and is a noticeable object in the northern heavens.

Ar'dea, the genus of birds to which the heron belongs, which includes also cranes, storks. bitterns, etc.

Ardèche (ar-dāsh), a dep. in the south of France (Languedoc). Area 2,134 sq. mi. It is generally of a mountainous character, and contains the culminating point of the Cevennes. Silk and wine are produced. Annonay is the principal town, but Privas is the capital. Pop. 375,472.

Ardennes (ar-den'), an extensive tract of hilly land stretching over a large portion of the northeast of France and the southwest of Belgium. Anciently the whole tract formed one immense forest (*Arduenna Silta* of Cæsar); but though extensive districts are still under wood, large portions are now occupied by cultivated fields and populous towns.

Ardennes (ar-den<sup>7</sup>), a frontier department in the northeast of France; area 2,020 sq. mi., partly consisting of the Forest of Ardennes. There are extensive slate-quarries, numerous iron works, and important manufactures of cloth, ironware, leather, glass, earthenware, etc. Chief towns, Mézières (the capital), Rocroi, and Sedan. Pop. 332,759.

Are (är), the unit of the French land measure, equal to a hundred square meters, or 1,076.44 square feet. A *hectare* is 100 ares, equal to 2.47 acres.

Are'ca, a genus of lofty palms with pinnated leaves, and a drupe-like fruit enclosed in a fibrous rind. One species of the Coromandel and Malabar coasts is the common areca palm which yields areca or betel nuts, and also the astringent juice catechu. Another is the cabbage-tree or cabbage-palm of the West Indies. With lime and the leaves of the betel-pepper, the areca-nuts when green form the celebrated masticatory of the East. They are an important article in Eastern trade.

**Arecibo** ( $\dot{a}$ -re-th $\bar{e}'b\bar{o}$ ), a seaport town on the north coast of the island of Porto Rico. Pop. 10,000.

Are'na, the inclosed space in the central part of the Roman amphitheaters, in which took place the combats of gladiators or wild beasts. It was usually covered with sand or sawdust to prevent the gladiators from slipping, and to absorb the blood.

Arcometer. See Hydrometer.

Areopagus, the oldest of the Athenian courts of justice. It obtained its name from its place of meeting, on the Hill of Ares (Mars), near the citadel. It existed from very remote times, and the crimes tried before it were wilful murder, poisoning, robbery, arson, dissoluteness of morals, and innovations in the state and in religion.

Arequipa (a-rā-kē' pá), a city of Peru, 200 mi. s. of Cuzco, situated in a fertile valley, 7,850 feet above sea-level. Before the earthquake of 1868, which almost totally destroyed it, it was one of the best-built towns of South America. Behind the city rises the volcano of Arequipa, or Peak of Misté (20,328 feet). A considerable trade is carried on through Mollendo, which has superseded Islay as the port of Arequipa, and is connected with it by railway. Pop. 40,000.

**Arethu'sa,** in Greek mythology, a daughter of Nereus and Doris, a nymph changed by Artěmis into a fountain in order to free her from the pursuit of the river god Alpheus.

Arezzo (a-ret'sō), a city of central Italy, capital of a province of the same name in Tuscany. It has a cathedral, containing some fine pictures and monuments; remains of an ancient amphitheater, etc. It was one of the twelve chief Etruscan towns, and in later times fought long against the Florentines, to whom it had finally to succumb. It is the birthplace of Mæcenas, Petrarch, Pietro Aretino, Redi, and Vasari. Pop. 11,816. The province of Arezzo contains 1,276 sq. mi. and 238,744 inhabitants. Ar'gal (Argol, or Tartar), a hard crust formed

Ar'gal (Argol, or Tartar), a hard crust formed on the sides of vessels in which wine has been kept, red or white according to the color of the wine. It is an impure bitartrate of potassium, and is of considerable use among dyers as a mordant. When purified it forms cream of tartar.

Ar'gall, SAMUEL (1572-1639), one of the early English adventurers to Virginia. He planned and executed the abduction of Pocahontas, the daughter of the Indian chief Powhattan, in order to secure the ransom of English prisoners. He was deputy-governor of Virginia (1617-1619), and was accused of many acts of rapacity and tyranny.

Ar'gand Lamp, a lamp named after its inventor, Aimé Argand (1755-1803), a Swiss chemist and physician, the distinctive feature of which is a burner forming a ring or hollow cylinder covered by a chimney, so that the flame receives a current of air both on the inside and on the outside.

**Argaum** (ar gá' um), a village of India, in Berar, celebrated for the victory of General Wellesley (Duke of Wellington) over the Mahrattas under Scindia and the Rajah of Berar, Nov. 20, 1803.

Ar'gelander, FREIDRICH WILHELM AUGUST (1709-1875), eminent German astronomer, director successively of the observatories of Abo and of Helsingfors: appointed professor of astronomy at Bonn, 1837, where he superintended the erection of a new observatory, catalogued over 320,000 stars, and produced several important astronomical works.

Argensola (ar-hen-so'lá), LUPERCIO and BARTOLOME LEONARDO DE, brothers, the "Horaces of Spain," b. at Barbastro, in Aragon, the former in 1565, d. in 1613; the latter b. 1566, d. in 1631. Lupercio produced tragedies and lyric poems; Bartolomé a number of poems and a history of the conquest of the Moluccas. Their writings are singularly alike in character, and are reckoned among the Spanish classics.

Ar'gentine Republic, formerly called the United Provinces of La Plata, a vast country of South America, the total area comprising 1,125,086 sq. mi. It comprises four great natural divisions: (1) the Andine region, containing the provinces of Mendoza, San Juan, Rioja, Catamarca, Tucuman, Salta, and Jujuy; (2) the Pampas, containing the provinces of Santiago, Santa Fé, Cordova, San Luis, and Buenos Ayres; with the territories Formosa, Pampa, and Chaco; (3) the Argentine Mesopotamia, between the rivers Paraná and Uruguay, containing the provinces of Entre Rios and Corrientes, and the territory Misiones: (4) Patagonia, including the eastern half of Terra del Fuego. With the exception of the n. w., where lateral branches of the Andes run into the plain for 150 or 200 mi., and the province of Entre Rios, which is hilly, the character-

# Argentine Republic

istic feature of the country is the great monotonous and level plains called "pampas." In the north these plains are partly forestcovered, but all the central and southern parts present vast treeless tracts, which afford pasture to immense herds of horses, oxen, sheep, and are varied in some places by brackish swamps, in others by salt steppes. The great water-course of the country is the Paraná, having a length of fully 2,000 miles from its source in the mountains of Goyaz, Brazil, to its junction with the Uruguay, where begins the estuary of La Plata. The Paraná is formed by the union of the Upper Paraná and Paraguay rivers, near the n.e. corner of the state. Important tributaries are the Pilcomayo, the Vermejo, and the Salado. The Paraná, Paraguay, and Uruguay are valuable for internal navigation. Many of the streams which tend eastward terminate in marshes and salt lakes, some of which are rather ex-tensive. Not connected with the La Plata system are the Colorado and the Rio Negro, the latter formerly the southern boundary of the state, separating it from Patagonia. The source of the Negro is Lake Nahuel Huapi, in Patagonia (area 1,200 sq. mi.), in the midst of magnificent scenery. The level portions of the country are mostly of tertiary formation, and the river and coast regions consist mainly of alluvial soil of great fertility. In the pampas clay have been found the fossil remains of extinct mammalia, some of them of colossal size.

European grains and fruits, including the vine, have been successfully introduced, and are cultivated to some extent in most parts of the republic, but the great wealth of the state lies in its countless herds of cattle and horses and flocks of sheep, which are pastured on the pampas, and which multiply there very rapidly. Gold, silver, nickel, copper, tin, lead, and iron, besides marble, jasper, precious stones, and bitumen, are found in the mountainous districts of the n. w., while petroleum wells have been discovered on the Rio Vermejo; but the development of this mineral wealth has hither to been greatly retarded by the want of proper means of transport. As a whole there are not extensive forests in the state except in the region of the Gran Chaco (which extends also into Bolivia), where there is known to be 60,000 sq. mi. of timber. Thousands of square miles are covered with thistles, which grow to a great height in their season. Cacti also form great thickets. Peach and apple trees are abundant in some districts. The native fauna includes the puma, the jaguar, the tapir, the llama, the alpaca, the vicuña, armadillos, the rhea or nandu, a species of ostrich, etc. The climate is agreeable and healthy, 97° being about the highest temperature experienced. Rain is less frequent than in the United Kingdom.

As a whole this vast country is very thinly inhabited, some parts of it as yet being very little known. The native Indians were never very numerous, and have given little trouble to the European settlers. Tribes of them, yet

### Argonauts

in the savage state, still inhabit the less known districts, and live by hunting and fishing. Some of the Gran Chaco tribes are said to be very fierce, and European travelers have been killed by them. The European element is strong in the republic, more than half the population being Europeans or of pure Euro-pean descent. Large numbers of immigrants arrive from Southern Europe, the Italians having the preponderance among those of foreign birth. The typical inhabitants of the pampas are the Gauchos, a race of half-breed cattlerearers and horse-breakers; they are almost continually on horseback, galloping over the plains, collecting their herds and droves, taming wild horses, or catching and slaughtering cattle. In such occupations they acquire a marvelous dexterity in the use of the lasso and bolas. The river La Plata was discovered in 1512 by the Spanish navigator, Juan Diaz de Solis, and the La Plata territory had been brought into the possession of Spain by the end of the sixteenth century. In 1810 the territory cast off the Spanish rule, and in 1816 the independence of the United States of the Rio de la Plata was formally declared, but it was long before a settled government was es-tablished. The present constitution dates from 1853, being subsequently modified. The executive power is vested in a presidentelected by the representatives of the fourteen provinces for a term of six years. A national congress of two chambers-a senate and a house of deputies-wields the legislative authority, and the republic is making rapid advances in social and political life. There are about 11,000 miles of railway constructed. The external commerce is important, the chief exports being wool, skins, and hides, live animals, mutton, tallow, bones, corn, and flax. The imports are chiefly manufactured goods. The trade is largely with Britain and France, and is increasing rapidly. Buenos Ayres is the capital of the state. Other towns are Cordova, Rosario, La Plata (a new city), Tucu-man, Mendoza, and Corrientes. The popula-tion of the republic, which is rapidly increasing, is estimated at 4,500,000.

Argives (ar') (or Argivi), the inhabitants of Argos; used by Homer and other ancient authors as a generic appellation for all the Greeks.

Ar gonaut, a name given to a species of cuttle-fishes, popularly known as the Paper Nautilus, or Paper Sailor. This is the animal so celebrated in poetry, and which formerly used to be regarded as sailing on the surface of the sea, using its two expanded arms as sails, and the other arms as oars—a statement purely fletitious and erroneous. The expanded arms are always clasped round the shell, and the creature can move only after the fashion of other cuttle-fishes.

Argonauts, in the legendary history of Greece, those heroes who performed a hazardous voyage to Colchis, a far-distant country at the eastern extremity of the Euxine (Black Sea), with Jason in the ship Argo, for the purpose of securing a golden fleece, which was



Argonaut.

preserved suspended upon a tree, and under the guardianship of a sleepless dragon. By the aid of Medea, daughter of the king of Colchis, Jason was enabled to seize the fleece, and, after many strange adventures, to reach his home at Iolcos in Thessaly. Among the Argonauts were Hercules, Castor and Pollux, Orpheus, and Theseus.

**Årgo-Navis**, the southern constellation of the Ship, containing 9 clusters, 3 nebulæ, 13 double, and 540 single stars, of which about 64 are visible.

Argonne, a district of France between the rivers Meuse, Marne, and Aisne, celebrated for the campaign of Dumouriez against the Prussians in 1702, and for the military movements and actions which took place therein previous to the battle of Sedan, in 1870.

Ar'gos, a town of Greece, in the northeast of the Peloponnesus, between the gulfs of Ægina and Nauplia or Argos. This town and the surrounding territory of Argolis were famous from the legendary period of Greek history onward, the territory containing, besides Argos. Mycenæ, where Agamemnon ruled, with a kind of sovereignty, over all the Peloponnesus. Argolis and Corinth now form a monarchy of the kingdom of Greece. Area 1,447 sq. mi.; pop. 136,081.

1,447 sq. mi.; pop. 136,081. **Ar'gus**, in Greek mythology, a fabulous being, said to have had a hundred eyes, placed by Juno to guard Io. Hence "argus-eyed," applied to one who is exceedingly watchful.

Argyle (or Argyll) (ar-gil'), a county in the Highlands of Scotland, consisting partly of mainland and partly of islands belonging to the Hebrides group, the chief of which are Islay, Mull, Jura, Tiree, Coll, Rum, Lismore, and Colonsay, with Iona and Staffa. Area 3,255 sq. mi., of which the islands comprise about 1,000 sq. mi. The county is mountainous. There are several lakes, the principal of which is Loch Awe. Cattle and sheep are reared in numbers, and fishing is largely carried on, as is also the making of whisky. There is but little arable land. The chief minerals are slate, marble, Ilmestone, and granite. County town, Inverary; others, Campbelton, Oban, and Dunoon. Pop. 75,495.

Argyle, CAMPBELLS OF, a historic Scottish family raised to the peerage in the person of Sir Duncan Campbell of Lochow, in 1445. The more eminent members are: (1) ARCHI-BALD, 2d Earl, killed at the battle of Flodden, 1513.—ARCHIBALD, 5th Earl, was the means of averting a collision between the Reformers and the French troops in 1559; commanded troops at the battle of Langside; d. 1575 .-ARCHIBALD, 8th Earl and Marquis, b. 1598; partisan of the covenanters; created a marquis by Charles I. It was by his persuasion that Charles II visited Scotland, and was crowned at Scone in 1651; tried for treason, and beheaded in 1661.-ARCHIBALD, 9th Earl, son of the preceding, was excluded from the general pardon by Cromwell in 1654. On the passing of the Test Act in 1681 he refused to take the required oath, was tried and sentenced to death. He escaped to Holland, was taken and conveyed to Edinburgh, where he was be-headed in 1685.—ARCHIBALD, 10th Earl and 1st Duke, son of the preceding, d. 1703; took an active part in the Revolution of 1688-89, which placed William and Mary on the throne. – JOHN, 2d Duke and Duke of Greenwich, son of the above, b. 1678, d. 1743; served at the battles of Ramilies, Oudenarde, and Malplaquet, and assisted at the sieges of Lisle and Ghent. He was long a supporter of Walpole, but his political career was full of intrigue. He is the Duke of Argyle in Scott's Heart of Midlothian.-George Douglas Campbell, 8th Duke, Baron Sundridge and Hamilton, was b. in 1823. In 1852 he became lord privy seal under Lord Aberdeen, and again under Lord Palmerston in 1859; postmaster-general in 1860; secretary for India from 1868 to 1874; again lord privy seal in 1880, but retired, being unable to agree with his colleagues on their Irish policy. He is author of *The Reign of Law, Scotland as* It Was and as It Is, etc. His eldest son, the Marquis of Lorne, married the Princess Louise, fourth daughter of Queen Victoria, in 1871.

Ariadne (a-ri-ad'ne), in Greek mythology, a daughter of Minos, king of Crete. She gave Theseus a clue of thread to conduct him out of the labyrinth after his defeat of the Minotaur. Theseus abandoned her on the Isle of Naxos, where she was found by Bacchus, who married her.

Arica (å-rē'ka), a seaport of Chile, 30 mi. s. of Tacna; previous to 1882 it belonged to Peru. It has suffered frequently from earthquakes, being in 1808 almost entirely destroyed, part of it being also submerged by an earthquake wave. Pop. about 4,000.

**Ariége** (å-rē-āzh), a mountainous department of France, on the northern slopes of the Pyrenees, comprising the ancient countship of Foix and parts of Languedoc and Gascony. Sheep and cattle are reared; the arable land is small in quantity. Chief town, Foix. Area 1,890 sq. mi.; pop. 1891, 22,749.

Aries (ā'ri-ēz) (the Ram), a northern con-

stellation of 156 stars, of which 50 are visible. It is the first of the twelve signs in the zodiac, which the sun enters at the vernal equinox, about the 21st of March. The first point in Aries is that where the equator cuts the ecliptic in the ascending node, and from which the right ascensions of heavenly bodies are reckoned on the equator, and their longitudes upon the ecliptic. Owing to the precession of the equinoxes the sign Aries no longer corresponds with the constellation Aries, which it did 2,000 years ago.

Ari'on, an ancient Greek poet and musician, born at Methymna, in Lesbos, flourished about B. c. 625. A fragment of a hymn to Poseidon, ascribed to Arion, is extant.

Arios'to, LUDOVI'CO (1474-1533), one of the most celebrated poets of Italy, b. at Reggio, in Lombardy. His lyric poems in the Italian and Latin languages, distinguished for ease and elegance of style, introduced him to the notice of the Cardinal Ippolito d'Este, son of Duke Ercole I of Ferrara. He began and finished, in ten or eleven years, his immortal poem, the Orlando Furioso, which was published in 1515, and immediately became highly popular. At Ferrara he employed himself in the composition of his comedies, and in putting the last touches to his Orlando. The Orlando Furioso is a continuation of the Orlando Innamorata of Bojardo, details the chivalrous adventures of the paladins of the age of Charlemagne, and extends to forty-six cantos.

Arista, MARIANO (1802-1855), Mexican general, born in the state of San Luis Potosi, died on board the British steamer Tagus. He took part in the war that established Mexican independence, was a successful military leader, and in 1836 was second in command to General Santa Anna. He commanded at Palo Alto and Resaca de lá Palma in the war between Mexico and the U. S. He was appointed minister of war in 1848. In 1850 General Arista became president of Mexico, which office he resigned Jan. 6, 1853. Soon afterward Arista was banished, and died in exile. In 1881 his remains were sent to Mexico.

Aristæus, in Greek mythology, son of Appollo and Cyrene, the introducer of beekeeping.

Aristarchus (a-ris-tär'kus), an ancient Greek grammarian, b. at Samothrace B. c. 160, d. at Cyprus B, c. 88. He criticised Homer's poems with the greatest acuteness and ability. His edition of Homer furnished the basis of all subsequent ones.

Aristarchus, an ancient Greek astronomer belonging to Samos, flourished between 280 and 264 B. C., and first asserted the revolution of the earth about the sun; also regarded as the inventor of the sun-dial.

**Aris' teas**, a personage of ancient Greek legend, represented to have lived over many centuries, disappearing and reappearing by turns.

Aristides, surnamed "the Just" (d. 468 B. c.), a celebrated Athenian statesman and military commander. At the time of the Per-

sian invasian under Darius, Aristides was one of the leaders of the Athenians. Owing to his influence and persuasion the chief command was given to Miltiades instead of changing daily among the ten generals as had been customary. To this fact was due in great measure the important victory at Marathon (490). The next year (489 B. C.) Aristides was appointed archon (chief magistrate), but his rival Themistocles managed to secure his ostracism on the pretext that he was becoming dangerous to the democracy (483). In connection with this incident is told the familiar story of Aristides's writing his own name on the shell for an illiterate citizen who wanted to vote for his ostracism, and gave as his only reason that he was tired of hearing Aristides called the Just. Such was his unselfish patriotism that during his exile he sought to unite the Grecian cities against the coming Persian invasian, and before the battle of Salamis (480) went to Themistocles and gave him his hearty support. He assisted in planning the engagement and himself took part in it. He afterward commanded the Athenian forces. When the Delian League was formed, certain states having become offended at the arrogance of Pausanias, they decided to form a confederation under the hegemony of Athens. Aristides was assigned the difficult task of adjusting the relations of the several members and assessing the expenses of the Persian war. When Themistocles was suspected, he did not join the prosecution, and after his rival's banishment always "spoke of him with admiration and respect." Aristides was so poor at his death that he was buried at public cost, but from a grateful country his children received dowries and a landed estate.

Aristip' pus, a disciple of Socrates, and founder of a philosophical school among the Greeks, which was called Cyrenaic, from his native town Cryěně, in Africa; flourished 380 В. С. His moral philosophy differed widely from that of Socrates, and was a science of refined voluptuousness. His fundamental principle was, that all human sensations may be reduced to two, pleasure and pain. Pleasure is a gentle, and pain a violent emotion. Ali living beings seek the former and avoid the latter. Happiness is nothing but a continued pleasure, composed of separate gratifications; and as it is the object of all human exertions we should abstain from no kind of pleasure. Still we should always be governed by taste and reason in our enjoyments. His doctrines were taught only by his daughter Arete, and his grandson Aristippus the younger, by whom they were systematized.

**Aristogeiton** (gi'ton), a citizen of Athens, whose name is rendered famous by a conspiracy (514 B. C.) formed in conjunction with his friend Harmodius against the tyrants Hippias and Hipparchus, the sons of Pisistratus. Both Aristogeiton and Harmodius lost their lives through their attempts to free the country, and were reckoned martyrs of liberty.

Aristophanes (tof a-nez) (444-380 B. c.), the greatest comic poet of ancient Greece, born

at Athens. He appeared as a poet in B. c. 427, and having indulged in some sarcasms on the powerful demagogue Cleon, was ineffectually accused by the latter of having unlawfully assumed the title of an Athenian citizen. He afterward revenged himself on Cleon in his comedy of the Knights, in which he himself acted the part of Cleon. The names of his extant plays are Acharnians, Knights, Clouds, Wasps, Peace, Birds, Lysistrata, Thesmophoriazusæ, Frogs, Ecclesiazusæ and Plutus.

Aristotie (384-322 B. c.), the greatest of ancient philosophers, founder of the Peripatetic School, the last and greatest of the famous trio of Greek philosophers which in-cluded the names of Socrates and Plato. At the age of 17 Aristotle went to study at Athens, where he remained for 20 years. He was a favorite pupil of Plato, who called him "the intellect of his school." He remained a warm admirer of Plato, though opposed to his philosophical teaching. About 343 Aristotle became the teacher of Alexander the Great. After the conquest of Persia, Alexander pre-sented him with nearly a million dollars. He also aided his scientific researches greatly by sending him a specimen of any plant or ani-mal found on his expeditions that was un-known in Greece. This friendship led the Athenians to accuse Aristotle of favoring Macedonia, and he was forced to flee to Chalcis, on the island of Eubœa, where he died. While at Athens Aristotle taught in the Lyceum, a gymnasium near the city, by which title the school is sometimes referred to. The name "Peripatetic" is due to the fact that he walked up and down (Gk. peripatein) while teaching. It was his custom to instruct his more intimate pupils in the problems of philosophy during the forenoon, and in the evening he gave public lectures to the people on less weighty subjects. Only a portion of Aristotle's writings has come down to us. Of his pre-served works the most important are: Logic, Rhetoric, Postics, Physics, Metaphysics, Eth-ics, Psychology, Politics, History of Animals, Meteorology. He was the creator of natural science. He was the first to divide the animal kingdom into classes, and came near discovering the circulation of the blood. Aristotle's moral and political philosophy is based on the peculiarities of the human organism, and all science must be based on logic, the science of thought. To him is due the famous syllogism, the simplest form that an argument may assume. He was the first to distinguish the substance of things from their accidental characteristics; i.e. matter and form. He established the so-called "cosmological argument" for the existence of God. This is, in substance, that everything in the world has a finite cause, and back of the long succession of finite causes there must be an infinite being, a first something, absolute reason, God. One of the problems of the ancient schools of philosophy was the attainment of the highest possible happiness. This Aristotle finds to be in the intelligent use of the reasoning powers, and it is the possession of these which distinguishes man from the beasts. Before the eleventh century Aristotle was but little known to the Christian world, although prized by the Arabians for three centuries prior to this. For four centuries he remained the authority of the Christian thinkers, but gradually his teachings became distorted and misunderstood. With the revival of learning his works were carefully studied and correctly interpreted, and their effect is felt in all subsequent philosophy, notably in Bacon, Kant, Spinoza, and Descartes.

Arith' metic, is primarily the science of numbers. As opposed to algebra it is the practical part of the science. Although the processes of arithmetical operations are often highly complicated, they all resolve them-selves into the repetition of four primary operations — addition, subtraction, multiplication, and division. Of these the two latter are only complex forms of the two former, and subtraction again is merely a reversal of the process of addition. Little or nothing is known as to the origin and invention of arithmetic. Some elementary conception of it is in all probability coeval with the first dawn of human intelligence. In consequence of their rude methods of numeration, the science made but small advance among the ancient Egyptians, Greeks, and Romans, and it was not until the introduction of the decimal scale of notation and the Arabic or rather Indian, numerals into Europe that any great progress can be traced. In this scale of notation every number is expressed by means of the ten digits -1, 2, 3, 4, 5, 6, 7, 8, 9, 0, by glving each digit a local as well as its proper or natural value. The value of every digit increases in a tenfold proportion from the right toward the left; the distance of any figure from the right indicating the power of 10, and the digit itself the number of those powers intended to be expressed; thus,  $3464=3000+400+60+4=3 \times 10^3+4 \times 10^2+6 \times 10+4$ . The earliest arithmetical signs appear to have been hieroglyphical, but the Egyptian hieroglyphics were too diffuse to be of any arithmetical value. The units were successive strokes to the number required, the ten an open circle, the hundred a curled palm-leaf, the thousand a lotus flower, ten thousand a bent finger. The letters of the alphabet afforded a convenient mode of representing figures, and were used accordingly by the Chaldeans, Hebrews, and Greeks. The first nine letters of the Hebrew alphabet represented the units; the second nine, tens; the remaining four, together with five repeated with additional marks, hundreds; the same succession of letters with added points was repeated for thousands, tens of thousands, and hundreds of thousands. The Greeks followed the same system up to tens of thousands. They wrote the different classes of numbers in succession as we do, and they transferred operations performed on units to numbers in higher places; but the use of different signs for the different ranks clearly shows a want of full perception of the value of place as such. They adopted the letter M as

a sign for 10,000 and by combining this mark with their other numerals they could note numbers as high as 100,000,000. The Roman numerals which are still used in marking dates or numbering chapters were almost useless for purposes of computation. From one to four were represented by vertical strokes I, II, III, IIII, five by V, ten by X, fifty by L, one hundred by C, five hundred by D, a thousand by M. These signs were derived from each other according to particular rules; thus, V was the half of X; L was likewise the balf of C: M was artistically written M, and D became five hundred. CCI represented 5,000. They were also compounded by addition and subtraction; thus, IV stood for four, VI for six, XXX for thirty, XL for forty, LX for sixty. Arithmetic is divided into abstract and practical; the former comprehends notation, numeration, addition, subtraction, multiplication, and division, measures and multiples, fractions, powers and roots; the latter treats of the combinations and practical applications of these and the so-called rules, such as reduction, compound addition, subtraction, multiplication, and division, proportion, interest, profit and loss, etc. Another division is integral and fractional arithmetic, the former treating of integers, or whole num-bers, and the latter of fractions. Decimal fractions were invented in the sixteenth century, and logarithms, embodying the last great advance in the science, in the seventeenth century.

Arithmet' ical, pertaining to arithmetic or its operations. Arithmetical mean, the middle term of three quantities in arithmetical progression, or half the sum of any two proposed numbers; thus 11 is the arithmetical mean to 8 and 14. Arithmetical progression, a series of numbers increasing or decreasing by a common difference, as 1, 3, 5, 7, etc. Arithmetical signs, certain symbols used in arithmetic, and indicating processes or facts. The common signs used in arithmetic are the following: + signifying that the numbers between which it is placed are to be added; that the second is to be subtracted from the first;  $\times$  that the one is to be multiplied by the other: + that the former is to be divided by the latter: = signifies that the one number is equal to the other; :, ::, : are the signs placed between the members of a proportional series, as 4:6::8:12. A period placed to the left of a series of figures indicates that they are decimal fractions.

Arizona, a territory of the U. S., containing 113,020 sq. mi. Its breadth is about 335 mi., length about 390 mi. The surface consists of elevated table-lands intersected by mountains and interspersed with valleys. The soil is rich. The agricultural and horticultural products are principally alfalfa, grain, potatoes, sorghum, apricots, peaches, grapes, apples, oranges, lemons, pears, plums, figs, almonds, dates, etc. The precious metals are gold, silver, copper, lead, and limestone. The mineral output for 1896 aggregated \$13,978,-263.20. The stock industry is one of consider-

able proportions. For 1896 it gave a return of \$2,757,287.50. Arizona possesses valuable forests which cover an area of 10,000 sq. mi. Its plains sustain large herds of cattle and sheep. The climate varies from the temperate in the northern portion of the territory to a semitropical in the southern. The air is dry and pure. Manufacturing is carried on in a limited way. Twelve railroads are operated in the territory with a total mileage of 1,295,928. The names of the different railroads are as follows: Atlantic & Pacific; Southern Pacific; Arizona & New Mexico; Central Ari-zona; Arizona & Southeastern; Maricopa & Phœnix; New Mexico & Arizona. The Santa Fé, Prescott & Phœnix; The United Verde & Pacific; Globe, Gila Valley & Northern; Phœnix, Tempe & Mesa; and The Congress Gold Mine Railroad. A conservative estimate of the taxable property of the territory is at least \$90,000,000. There are five national banks in Arizona with a paid-up capital of \$400,000 and a surplus of about \$84,180. There are seven banks organized under the incorporation laws of the territory, and one private bank. There are, on reservations within the borders of the territory, as near as can be ascertained, 38,000 Indians. For these people the government has established Indian schools which have produced good Considerable attention is given to results. education in general, and the manner in which the normal and public schools are carried on is meritorious. The University of Arizona, located at Tucson, was established in 1885 and is now in a flourishing condition. The number of public schools in the terri-tory is 223. The whole amount expended for school purposes during 1896 was nearly \$250,-000, and the valuation of school property was \$500,000. The library at the University of Arizona contains about 700 volumes and receives the principal educational publications. The penal, charitable, and reformatory institutions of the territory are three in number: the insane asylum, the Territorial prison, and the reform school. There are various church organizations with property of considerable value. The social advancement in the last few years has been very great. The news-paper field of Arizona is well occupied, there being a newspaper published in every county. There is scarcely a town of 300 inhabitants in which there is not a weekly newspaper. The total number of papers in the territory is 35, of which 8 are daily, 26 weekly, and one monthly. Arizona has twelve counties. The principal towns are Prescott, the seat of the capital; Tucson, a Mexican town; Yuma; Tomb-stone; Phœnix; Saint John; Clifton; Globe; and Mineral Park. It was first visited by the Spaniards in 1570. From 1821 to 1848 it was a part of Mexico when it passed to the U.S. by the treaty of Guadalupe Hidalgo. In 1863 it was organized into a territory. In 1896 the population was 101,240.

**Àrk**, the name applied in our translation of the Bible to the boat or floating edifice in which Noah resided during the flood or deluge; to the floating vessel of bulrushes in which the infant Moses was laid; and to the chest in which the tables of the law were preserved—the *ark of the covenant*.

Arkansas (ar'-kan-sa), one of the southwestern states of the U.S. with an area of 52,198 sq. mi. It is bounded n. by Missouri; e. by Tennessee and Mississippi, from which it is separated by the Mississippi River; s. by Louisiana; and w. by the Indian territory. It belongs to the great basin of the Mississippi, being watered by that river, and by several of its main tributaries, which are all more or less navigable. Of these the principal are the St. Francis, in the north east; the White River with its affluents, the Cache, Little Red, and Black rivers in the north; and notably the Arkansas, which, entering the state at Fort Smith, traverses it in a southeasterly direction until it joins the Mississippi at Napoleon. The southern part of the state is watered by the Washita in the east, and by a bend of the Red River in the The eastern part of the state, bordering west. on the Mississippi, is low and swampy, and is annually overflowed. Westward the country gradually attains a greater elevation, pas-sing off into hills and undulating prairies, which lead up to the Ozark Mountains, beyond which, again, an elevated plain stretches toward the Rocky Mountains. The Ozark Mountains do not exceed 2,000 feet in height, and the only other great masses of elevation are the Black Hills and the Washita Hills.

Soil.—In the eastern part of the state lies a strip of rich, alluvial, swampy land which extends as far west as Crowley's Ridge. The lower Arkansas River also traverses a similar low and wet tract. In the southern half of the state are great areas of loamy land interspersed with tracts of lead clay and hills of iron ore. There are great slity prairies west of Crowley's Ridge; in the west and northwest are prairies of red loam, and in the north is the Ozark mountain region. In many regions coal comes to the surface of the ground and is being worked to some extent; the quality is very good. Silver, galena, and zinc are abundant, as also are iron ores. There are many stone quarries in the state which yield novaculate hone stone.

Vegetation.-- Extensive forests of valuable timber are found in the hill country and occasionally in the bottom-lands of Arkansas. About one fourth of the area of the state is covered with yellow-pine timber land. Along the lakes and bayous are dense forests of cypress. The other timber trees are several species of oak, red cedar, black walnut, tupelo gum, cherry, maple, black locust, sassafras, red mulberry, and osage orange. There are also ash, hickory, gum, beech, pecan, sycamore, elm, cottonwood, and hackberry trees; also the holly, willow, catlep, box elder, butternut, palmetto, dogwood, plum, hornbeam, ironwood, mockery nut, juniper and laurel. There are also extensive canebrakes in the lowlands. There are some wild fruit and berries, as the paw-paw, persimmon, haw, whortleberry, wild plum, and chinquapin. Apples,

peaches, pears, plums, apricots, cherries, nectarines, grapes, blackberries, and strawberries are of fine quality and abundant. Arkansas is rich in cereals and Indian corn. There are over thirty varieties of grasses in Arkansas, the hay crop being more important than that of any other southern state. Cotton is the staple product and is grown on the lowlands and on the hills.

Climate. — On the whole, Arkansas has a very fine climate, although malarial fevers and extreme heat are to be encountered in the marshy and flat districts. In the northwestern part of the state the mean annual temperature is about 61°, and the annual rainfall about 55 inches. In the western part of the state the rainfall is about 41 inches. The eastern part of the state is hot, and in the swampy, overflowed lands there is considerable fever and ague and sometimes yellow fever. The climate is noted for the relief it gives to people afflicted with pulmonary diseases. Hot Springs, Ark., is a popular resort for invalids during the winter season.

Manufactures.—There are many mills for the sawing of lumber and kindred operations, and mills for the extraction of cottonseed oil are being established very rapidly.

History.—This region was formerly a part of the French colony of Louisiana which was purchased by the U. S. in 1803. The earliest French settlement was made at Arkansas Post in 1685. Arkansas was organized as a territory in 1819 and became a state in 1836. This was one of the seceding states in 1861 and on its soil were fought many of the battles. The principal towns are Little Rock, the capital, Hot Springs, Pine Bluff, Texarcana. Helena and Ft. Smith. The population in 1890 was 1,128,179, of which over 300,000 were colored.

Governors.—James S. Conway, 1836; Archibald Yell, 1840; Samuel Adams, 1844; Thomas S. Drew, 1844; John S. Roane, 1848; Elias N. Conway, 1852; Henry M. Rector, 1860; Harris Flanagin, 1862; Isaac Murphy, 1804; Powell Clayton, 1868; Orzo H. Hadley, 1871; Elisha Bayter, 1872; Augustus H. Garland, 1874; William R. Miller, 1877; Thomas J. Churchill, 1881; James H. Berry, 1883; Simon P. Hughes, 1885; James P. Eagle, 1889; William M. Fishback, 1893; James P. Clarke, 1805; D. W. Jones, 1896.

Arkansas City, Cowley co., Kan., on Arkansas and Walnut rivers. Railroads: Santa Fé; Missouri Pacific; St. L. & S. F.; and Northwestern. Industries: railroad shops, three flouring mills, two iron foundries, chair, mattress, and other factories. There is some natural gas in the vicinity, not extensively developed. Arkansas City has been for many years the outfitting point for the various reservations in Oklahoma and Indian Territory. The town was first settled in 1869 by the Norton Colony and became a city in 1870. Pop. est. 1897, 7,000.

Arkansas, a river of the U.S., which gives its name to the above state, the largest affluent of the Mississippi after the Missouri. It

rises in the Rocky Mountains, about lat.  $39^{\circ}$ n. lon.  $107^{\circ}$  w., flows in a general southeasterly direction through Colorado, Kansas, the Indian Territory, and falls into the Mississippi. Length 2,170 mi.

Ark' wright, RICHARD (1732-1792), famous for his inventions in cotton-spinning, was born at Preston, in Lancashire. The youngest of thirteen children, he was bred to the trade of a barber. When about thirty-five years of age he gave himself up exclusively to the subject of inventions for spinning cotton. The thread spun by Hargreaves's jenny could not be used except as weft, being destitute of the firmness or hardness required in the longitudinal threads or warp. But Arkwright supplied this deficiency by the invention of the spinningframe, which spins a vast number of threads of any degree of fineness and hardness, leaving the operator merely to feed the machine with cotton and to join the threads when they happen to break. His invention introduced the system of spinning by rollers, the carding, or roring, as it is technically termed (that is, the soft, loose strip of cotton), passing through one pair of rollers, and being received by a second pair, which are made to revolve with (as the case may be) three, four, or five times the velocity of the first pair. By this contrivance the roving is drawn out into a thread of the desired degree of tenuity and hardness. His inventions being brought into a pretty advanced state, Arkwright removed to Nottingham in 1768 in order to avoid the attacks of the same lawless rabble that had driven Hargreaves out of Lancashire. Here his operations were at first greatly fettered by a want of capital; but two gentlemen of means having entered into partnership with him, the necessary funds were obtained, and Arkwright erected his first mill, which was driven by horses, at Nottingham, and took out a patent for spinning by rollers in 1769. As the mode of working the machinery by horse-power was found too expensive he built a second factory on a much larger scale at Cromford, in Derbyshire, in 1771, the machinery of which was turned by a water-wheel. Having made several additional discoveries and improvements in the processes of carding, roving, and spinning, he took out a fresh patent for the whole in 1775, and thus completed a series of the most ingenious and complicated machinery. Notwithstanding a series of lawsuits in defense of his patent rights, and the destruction of his property by mobs, he amassed a large fortune. He was knighted by George III in 1786.

Arle (arl), a town of southern France, dep. Bouches du Rhône, 17 mi. s.e. of Nismes. It was an important town at the time of Cæsar's invasion, and under the later emperors it became one of the most flourishing towns on the further side of the Alps. It still possesses numerous ancient remains, of which the most conspicuous are those of a Roman amphitheater, which accommodated 24,000 spectators. It has a considerable trade, manufactures of silk, etc., and furnishes a market for the surrounding country. Pop. 13,291.

# Armadillo

Arlington, Alexandria co., Va., a few miles from Washington city, on the opposite bank of the Potomac. Close by lies the famous "Arlington Heights," the country-seat of Gen. R. E. Lee, which was confiscated by the government after the war, but was restored to his family subsequently. Pop. 5,000.

Arlington, Middlesex co., Mass., 6 mi. from Boston, seat of Mount Hope Hospital for the Insane. It has several small factories and a savings bank. Pop. 5,625.

Arm, the upper limb in man, connected with the thorax or chest by means of the scapula or shoulder-blade, and the clavicle or collar-bone. See Anatomy.

Arma'da, the Spanish name for any large naval force; usually applied to the Spanish fleet vaingloriously designated the *Invincible* Armada, intended to act against England A. D. 1588. It was under the command of the Duke of Medina-Sidonia, and consisted of 130 great war vessels, larger and stronger than any belonging to the English fleet, with 30 smaller ships of war, and carried 19,925 marines, 8,460 sailors, 2,088 slaves, and 2,630 cannons. It had scarcely quitted Lisbon on May 29, 1588, when it was shattered by a storm, and had to be refitted in Corunna. It was to co-operate with a land force collected in Flanders under the Prince of Parma, and to unite with this it proceeded through the English Channel toward Calais. In its progress it was attacked by the English fleet under Lord Howard, who, with his lieutenants Drake, Hawkins and Frobisher, endeavored by dexterous seamanship and the discharge of well directed volleys of shot to destroy or capture the vessels of the enemy. The great lumbering Spanish vessels suffered severely from their smaller opponents, which most of their shot missed. Arrived at length off Dunkirk, the armada was becalmed, thrown into confusion by fire-ships, and many of the Spanish vessels destroyed or taken. The Duke of Medina-Sidona, owing to the severe losses, at last resolved to abandon the enterprise, and conceived the idea of reconveying his fleet to Spain by a voyage round the north of Great Britain; but storm after storm assailed his ships, scattering them in all directions and sinking many. Some went down on the cliffs of Norway, others in the open sea, others on the Scottish coast. About thirty vessels reached the Atlantic Ocean, and of these several were driven on the coast of Ireland and wrecked. In all, seventy-two large vessels and over 10,000 men were lost.

Armadil' lo, a toothless mammal, peculiar to South America, consisting of various species, belonging to a family intermediate between the sloths and ant-eaters.



and ant-eaters. Armadillo. They are covered with a hard, bony shell,

divided into belts, composed of small separate plates like a coat of mail, flexible everywhere except on the forehead, shoulders, and haunches, where it is not movable. The belts are connected by a membrane, which enables the animal to roll itself up like a hedgehog. These animals burrow in the earth, where they lie during the daytime, seldom going abroad except at night. They are of different sizes: the largest being 3 feet in length without the tail, and the smallest only 10 inches. They subsist chiefly on fruits and roots, sometimes on insects and flesh. They are inoffensive, and their flesh is esteemed good food.

Armagh (ar-mä'), a county of Ireland, in the province of Ulster. Area 328,086 acres, of which about half is under tillage. The manufacture of linen is carried on very extensively. Armagh, Lurgan, and Portadown are the chief towns. Pop. 143,056.—The county town, ARMAGH, formerly a Parliamentary borough, is situated partly on a hill, about half a mile from the Callan. It has a Protestant cathedral crowning the hill, a Gothic building dating from the eighth century, repaired and beautified recently; a new Roman Catholic cathedral in the pointed Gothic style, and various public buildings. It is the see of an archbishop of the Protestant Episcopal Church, who is primate of all Ireland, and is a place of great antiquity. Pop. 1891, 8,303.

Armagnac (ar-ma-nyak), an ancient territory of France, in the province of Gascony, some of the counts of which hold prominent places in the history of France.

Ar'mature, a term applied to the piece of soft iron which is placed across the poles of permanent or electro-magnets for the purpose of receiving and concentrating the attractive force. In the case of permanent magnets it is also important for preserving their magnetism when not in use, and hence is sometimes termed the keeper. It produces this effect in virtue of the well-known law of induction, by which the armature, when placed near or across the poles of the magnet, is itself converted into a temporary magnet with reversed poles, and these, reacting upon the permanent magnet, keep its particles in a state of constant magnetic tension, or in other words, in that constrained position which is supposed to constitute magnetism. A horseshoe magnet should therefore never be laid aside without its armature; and in the case of straight-bar magnets two should be placed parallel to each other, with their poles reversed, and a keeper or armature across them at both ends. The term is also applied to the core and coil of the electro-magnet, which revolves before the poles of the permanent magnet in the magneto-electric machine.

Arme' nia, a mountainous country of western Asia, not now politically existing, but of great historical interest, as the original seat of one of the oldest civilized peoples in the world. It is now shared between Turkey, Persia, and Russia. It has an area of about 137,000 sq. mi., and is intersected by the Euphrates, which divides it into the ancient divisions, Armenia Major and Armenia Minor. The country is an elevated plateau, inclosed on several sides by the ranges of Taurus and Anti-Taurus, and partly occupied by other mountains, the loftiest of which is Ararat. Several important rivers take their rise in Armenia; namely, the Kur

or Cyrus, and its tributary the Aras or Araxes, flowing east to the Caspian Sea: the Halys or Kizil - Irmak. flowing north to the Black Sea; and the Tigris and Euphrates, which flow into the Persian Gulf. The chief lakes are Van 4 and Urumi-



Armenian.

The climate is rather severe. vah. soil is on the whole productive, though in many places it would be quite barren were it not for the great care taken to irrigate it. Wheat, barley, tobacco, hemp, grapes, and cotton are raised; and in some of the valleys apricots, peaches, mulberries, and walnuts are grown. The inhabitants are chiefly of the genuine Armenian stock, a branch of the Aryan or Indo-European race; but besides them, in consequence of the repeated subjugation of the country, various other races have obtained a footing. The total number of Armenians is estimated at 2,000,000, of whom probably one-half are in Armenia. The remainder, like the Jews, are scattered over various countries, and being strongly addicted to commerce, play an important part as merchants. They retain, however, in their different colonies their distinct nationality. Little is known of the early history of Armenia, but it was a separate state as early as the eighth century B. c., when it became sub-ject to Assyria, as it did subsequently to the Medes and the Persians. It was conquered by Alexander the Great in 325 B. C., but regained its independence about 190 B. c. Its king Tigranes, son-in-law of the celebrated Mithridates, was defeated by the Romans under Lucullus and Pompey about 69-66 B. c., but was left on the throne. Since then its fortunes have been various under the Romans, Parthians, Byzantine emperors, Persians, Saracens, Turks, etc. A considerable portion of it has been acquired by Russia in the present century, part of this in 1878.

The Armenians received Christianity as early as the second century. During the Monophysitic disputes they held with those who rejected the twofold nature of Christ, and being dissatisfied with the decisions of the Council of Chalcedon (451) they separated from the Greek Church in 536. The popes have at different times attempted to gain them

over to the Roman Catholic faith, but have not been able to unite them permanently and generally with the Roman Church. There are, however, small numbers here and there of United Armenians, who acknowledge the spiritual supremacy of the pope, agree in their doctrines with the Catholics, but retain their peculiar ceremonies and discipline. But the far greater part are yet Monophysites, and have remained faithful to their old religion and worship. Their doctrine differs from the orthodox chiefly in their admitting only one nature in Christ, and believing the Holy Spirit to proceed from the Father alone. Their sac-raments are seven in number. They adore saints and their images, but do not believe in purgatory. Their hierarchy differs little from that of the Greeks. The Catholicus, or head of the church, has his seat at Etchmiadzin, a monastery near Erivan, the capital of Russian Armenia, on Mount Ararat. Turkish Armenia has been the scene of repeated massacres and outrages on Christians, evoking the indignation of the civilized world.

The Armenian language belongs to the Indo-European family of languages, and is most closely connected with the Iranic group. The Old Armenian or Haikan language, which is still the literary and ecclesiastical language, is distinguished from the new Armenian, the ordinary spoken language, which contains a large intermixture of Persian and Turkish elements. The most flourishing period of Armenian literature extended from the fourth to the fourteenth century. It then declined, but a revival began in the seventeenth century, and at the present day wherever any extensive community of Armenians have settled they have set up a printing-press. The Armenian Bible, translated from the Septuagint by Isaac or Sahak, the patriarch, early in the fifth century, is a model of the classic style.

Armentières (ar-man-tyar), a town in France, dep. Nord, 10 mi. w. n. w. of Lille, on the The town has extensive manufactures Lys. of linen and cotton goods and an extensive trade. Pop. 26,614.

Armida (ar-mē'-da), a beautiful enchantress in Tasso's Jerusalem Delivered, who succeeds in bringing the hero, Rinaldo, with whom she had fallen violently in love, to her enchanted gardens. Here he completely forgets the high task to which he had devoted himself, until messengers from the Christian host, having arrived at the island, Rinaldo escapes with them by means of a powerful talisman. In the sequel Armida becomes a Christian.

Armin'ius, an ancient German hero celebrated by his fellow-countrymen as their deliverer from the Roman yoke; b. about 18-16 B. C., assassinated A. D. 19. He served in the Roman army, and was raised to the rank of eques. Returning home he found the Roman governor, Quintilius Varus, making efforts to Romanize the German tribes near the Rhine. He completely annihilated the army of Varus, consisting of three legions, in a three days' battle fought in the Teutoburg forest. After many years' resistance to the power of the empire he drew upon himself the hatred of his countrymen by aiming at the regal authority, and was assassinated.

Armiston, Calhoun co., Ala., 60 mi. e. of Birmingham. Railroads: two branches of Southern Railroad System, and Louisville & Nashville. Industries: iron and steel works, machine shops, net and frame works, iron pipe, and furnace factories. Surrounding country agricultural and mineral. The town was first settled in 1881 and became a city the same year. Pop. est. 1897, 12,500.

Armitage, EDWARD, an English historical painter, born in London, 1817. He is best known by his allegorical picture of Britannia and Columbia relieving Chicago.

Armor'ica ("upon the sea"), a name anciently applied to all northwestern Gaul, latterly limited to what is now Brittany. Hence Armoric is one name for Breton or the language of the inhabitants of Brittany, a Celtic dialect closely allied to Welsh.

Arms and Armor.-The former term is applied to weapons of offense, the latter to the various articles of defensive covering used in war and military exercises, especially before the introduction of gunpowder. Weapons of offense are divisible into two distinct sections -firearms, and arms used without gunpowder or other explosive substance. The first arms of offense would probably be wooden clubs; then would follow wooden weapons made more

deadly by means of stone or bone, stone axes, slings, bows and arrows with heads of flint or bone, and afterward various weapons of bronze. Subsequently a variety of arms of iron and steel were



Armor and Horse Armor.

introduced, which comprised the sword, javelin, pike, spear or lance, dagger, axe, mace, chariot scythe, etc.; with a rude artillery consisting of catapults, ballistæ, and battering-rams. From the descriptions of Homer we know that almost all the Grecian armor, defensive and offensive, in his time was of bronze; though iron was sometimes used. The lance, spear, and javelin were the principal weapons of this age among the Greeks. The bow is not often mentioned. Among ancient nations the Egyptians seem to have been most accustomed to the use of the bow, which was the principal weapon of the Egyptian infantry. Peculiar to the Egyptians was a defensive weapon intended to catch and break the sword of the enemy. With the Assyrians the bow was a favorite weapon; but with them lances, spears, and javelins were in more common use than with the Egyptians. Most of the large engines of warchariots with scythes projecting at each side from the axle, catapults, and ballistæ — seem to have been of Assyrian origin. During the historical age of Greece the characteristic weapon was a heavy spear from 21 to 24 feet in length.



#### Arms

The sword used by the Greeks was short, and was worn on the right side. The Roman sword was from 22 to 24 inches in length, straight, two-edged, and obtusely pointed, and as by the Greeks was worn on the right side. It was used principally as a stabbing weapon. It was originally of bronze. The most characteristic weapon of the Roman legionary soldier, however, was the *pilum*, which was a kind of pike



1, 2, Early Greek. 3, Greek. 4, 5, Roman. 6, Barbarian.

or javelin, 6 feet or more in length. The pilum was sometimes used at close quarters, but more commonly it was thrown. The favorite weapons of the ancient Germanic races were the battle-axe, the lance or dart, and sword. The weapons of the Anglo-Saxons were spears, axes, swords, knives, and maces or clubs. The Normans had similar weapons, and were well furnished with archers and cavalry. The crossbow was a comparatively late invention introduced by the Normans. Gunpowder was not used in Europe to discharge projectiles till the beginning of the fourteenth century. Cannon are first mentioned in England in 1338, and there seems to be no doubt that they were used by the English at the siege of Cambrai in 1339. The projectiles first used for cannon were of stone. Hand firearms date from the fifteenth century. At first they required two men to serve them, and it was necessary to rest the muzzle on a stand in aiming and firing. The muzzle on a stand in aiming and firing. first improvement was the invention of the match-lock, about 1476; this was followed by the wheel-lock, and about the middle of the seventeenth century by the flint-lock, which was in universal use until it was superseded by the percussion-lock, the invention of a Scotch clergyman early in the nineteenth century. The needle-gun dates from 1827. The only important weapon not a firearm that has been invented since the introduction of gunpowder is the bayonet, which is believed to

have been invented about 1650. See Cannon, Musket, Rifle, etc.

Some kind of defensive covering was probably of almost as early invention as weapons of offense. The principal pieces of defensive armor used by the ancients were shields, helmets, cuirasses, and greaves. In the earliest ages of Greece the shield is described as of immense size, but in the time of the Peloponnesian war (about B. c. 420) it was much smaller. The Romans had two sorts of shields: the *scutum*, a large, oblong, rectan-gular, highly convex shield, carried by the legionaries; and the *parma*, a small, round, or oval flat shield, carried by the light-armed troops and the cavalry. In the declining days of Rome the shields became larger and more varied in form. The helmet was a characteristic piece of armor among the Assyrians, Greeks, Etruscans, and Romans. Like all other body armor it was usually made of bronze. The helmet of the historical age of Greece was distinguished by its lofty crest. The Roman helmet in the time of the early emperors fitted close to the head, and had a neck-guard and hinged cheek-pieces fastened under the chin, and a small bar across the face for a visor. Both Greeks and Romans wore cuirasses, at one time of bronze, but latterly of flexible materials. Greaves for the legs were worn by both, but among the Romans usually on one The ancient Germans had large shields leg. of plaited osier covered with leather; afterward their shields were small, bound with iron, and studded with bosses. The Anglo-Saxons had round or oval shields of wood, covered with leather, and having a boss in the center; and they had also corselets, or coats of mail, strengthened with iron rings. The Normans were well protected by mail; their shields were somewhat triangular in shape, their helmets conical. In Europe generally metal armor was used from the tenth to the eighteenth century, and at first consisted of a tunic made of iron rings firmly sewn flat upon strong cloth or leather. The rings were afterward interlinked one with another so as to form a garment of themselves, called chain-Great variety is found in the pattern of mail. the armor, and in some cases small pieces of metal were used instead of rings, forming what is called scale-armor. A suit of armor consisting of larger pieces of metal, called platearmor, was now introduced, and the whole body came to be incased in a heavy metal covering. The various forms of ring or scale armor were gradually superseded by the plate-armor, which continued to be worn until long after the introduction of firearms and field artillery. A complete suit of armor was an elaborate and costly equipment, consisting of a number of different pieces, each with its distinctive name. In modern European armies the metal cuirass is still to some extent in use, the cuirassiers being heavy cavalry; and it is said that this piece of armor proves a useful defense against rifle bullets. During all the time that the use of heavy armor prevailed, the horsemen, who

alone were fully armed, formed the principal strength of armies: and infantry were generally regarded as of hardly any account. England was, however, an exception, as the English archers were almost at all times, before the invention of gunpowder, an important and sometimes the chief force in the army. The bow (long-bow) of the English archers was from 5 to 6 feet in length, and the arrow discharged from it was itself a yard long. The long-bow continued in general use in England till the end of the reign of Elizabeth, and even as late as 1627 there was a body of English archers in the pay of Richelieu at the siege of La Rochelle.

Armstrong, JOHN (1758-1843), soldier, b. in Carlisle, Pa. In 1775, while a student at Princeton, he enlisted in a Pennsylvania regiment, and was appointed aide to Gen. Hugh Mercer. Afterward he became aide to General Gates, with the rank of major, serving in the campaign against Burgoyne and in the South. On March 10, 1783, an anonymous notice was circulated among the officers, urging the troops to lay down their arms, and complaining of the neglect of Congress to give proper attention to their condition. This paper is known as the "Newburg Memorial;" in later years Major Armstrong confessed that he was the author. When the army disbanded Armstrong returned to Carlisle, and soon afterward was made secretary of state, and later adjutant-general of Pennsylvania. Armstrong married a sister of Robert R. Livingston, of New York, removed to that state, and settled on a farm in the old Livingston manor, 1789. In 1800 he was elected to the U.S. Senate, and in 1804 was appointed minister to France: later he became minister to Spain. In 1810 he returned to New York. During the war of 1812 he was made brigadier-general, and in 1813 was appointed secretary of war. He resigned in September, 1814. He published a History of the War of 1812, and a Review of General Wil-kinson's Memoirs.

Armstrong, WILLIAM GEORGE, engineer and mechanical inventor, born at Newcastle-on-Tyne, 1810. Among his early inventious were the hydro-electric machine, a powerful apparatus for producing frictional electricity, and the hydraulic crane. In 1846 the Elswick works, near Newcastle, were established for the manufacture of his cranes and other heavy iron machinery, and these works are now among the most extensive of their kind. Here the first rifled ordnance gun which bears his name was made in 1854. (See next article.) His improvements in the manufacture of guns and shells led to his being appointed engineer of rifled ordnance under government, and he was knighted in 1858. This appointment came to an end in 1863, since which time his ordnance has taken a prominent place in the armaments of different countries. He was raised to the peerage as Baron Armstrong in 1887.

Armstrong Gun, a kind of cannon, so-called from its inventor, made of wrought-iron, principally of spirally-coiled bars, so disposed as to bring the metal into the most favorable position for the strain to which it is to be exposed, and occasionally having an inner tube or core of steel, rifled with numerous shallow grooves. The size of these guns ranges from the smallest field-piece to pieces of the highest caliber. The projectile is coated with lead, and inserted into a chamber behind the bore. This the explosion drives forward, compressing its soft coating into the grooves, so as to give it a rotary motion, and at the same time obviate windage. Both breech-loading and muzzle-loading Armstrong guns are made.

Army, a body of armed men, so organized and disciplined as to act together, be mutually reliant, and perform in unison the evolutions of the march and battle-field according to the absolute will of one man. An army is a movable engine composed of a vast number of individual parts or powers, arranged so as not only to act in concert, but to exert their whole aggregate force in any direction and upon any point which may be ordered or required. The organization of an army is of two kinds,— tactical and administrative. The former enables the leader of an army to transmit his orders to three or four subordinate commanders, who pass them on to three or four others under them, until, through a regular chain of responsibility, the original impulse is communicated to the private soldier. The latter, in a similar manner, divides the army into groups of gradually decreasing size, so that the men may be efficiently paid, fed, clothed, and armed. The present article will treat only of the constitution and establishment of armies, and indicate their gradual historical develop-ment. Technical terms generally, as well as all the component elements of the army, in personnel and material, and the organization and duties of the troops, will be found noticed under their proper headings; the tactical positions of an army are defined below. Ancient Armies.—The earliest regular mili-

tary organization is attributed to Sesostris, who flourished in Egypt about sixteen cen-turies B.C. This extraordinary conqueror divided Egypt into thirty-six military prov-inces, and established a sort of militia, or warrior caste, to each member of which he allotted lands for the support of himself and his family. After him, little further progress was made in military art until the Persian Empire arose. Its soldiers introduced the mass-formation, with cavalry in intervals of squares; but the most important feature of the Persian organization was the establishment of what was practically a standing army, divided as garrisons throughout the conquered provinces, and under the control of military governors distinct from the satraps. In time of war this standing army was augmented by a general levy which included the tributary nations, and therefore resulted in a heterogeneous collection of barbarous and undisciplined peoples: a source of weakness which caused the defeat of Xerxes's numerically powerful army. In Greece, it was not a standing army, but a sort of national

militia, that gained Marathon, Platæa, and Mycale. The leading men in each state paid attention to organization and tactics in a way never before seen. The Lacedæmonians invented the phalanx, a particular mass-formation for foot-soldiers; and to this the Athenians added lighter troops to cover the front and harass the enemy in march. Their cavalry also were efficient and alert. The Thebans introduced the column formation, which, being deeper and narrower than the phalanx, was intended to pierce the enemy's line at some one point, and throw them into confusion. Philip, the father of Alexander the Great, established in Macedonia the world's second standing army; and, as a further change, made the phalanx deeper and more massive than it had been among the Lacedæmonians. He brought into use the Macedonian pike, a formidable weapon 24 feet in length. With a phalanx sixteen ranks in depth, six rows of men could present the points of these long pikes protruding in front of the front rank, forming a bristling array of steel terrible to encounter. Meanwhile, a more western power was developing what was perhaps the most perfect organization in the annals of military history. The Romans initiated changes in army matters which have had a wide-spread influence throughout the civilized world. About the period 200 B.C., every Roman, from the age of 17 to 46, was liable to be called upon to serve as a soldier; the younger men were preferred, but all were available up to the middle time of life. They They went through a very severe course of drill and discipline, to fit them alike for marching, fighting, camping, working, carrying, and other active duties. The Roman legion, in its best days, excelled all other troops alike in discipline and in esprit. So long as none but freemen were enlisted, the position of a legionary was one of honor; but when it became necessary to supply the armies of ambitious leaders with large drafts of slaves and crimiwith that of the individual. With a gradual laxity in discipline, the decline of the Roman power commenced. The undercurrent of insubordination resulted in reverses, and though discipline was revived spasmodically under great commanders, it ultimately died out.

Medieval Armies. — With the decline of the Roman power, all that remained of scientific warfare was lost for a time. The northern invaders made little use of tactics, but relied chiefly on their personal bravery, and on the impetuosity and weight of their attack in column. The army, among the Franks and Germans, was the nation. Kings and generals were intrusted in time of war with an absolute power, which the nation resumed with the return of peace. The conquerors of the Roman Empire at first recognized no superior save the community, of which all conquests were the property; individual chiefs rewarding their own followers with gifts of the lands they had helped to conquer. The growth of a feeling that such gifts could be revoked, and

that they implied an obligation to future service, marks the beginning of the Feudal System, under which national armies disappeared. and each baron had a small army composed of his own militia or retainers, available for bat-tle at short notice. The contests of these small armies, sometimes combined and sometimes isolated, make up the greater part of the wars of the Middle Ages. Of military tactics or strategy there was very little; the campaigns were desultory and indecisive; and the battles were gained more by individual valor than by any well-concerted plan. The Crusades effected some improvements in all these respects. The forces which went to the Holy Land were at first mere armed mobs, upheld by fanaticism, but ignorant of all discipline, and under leaders destitute alike of forethought and powers of combination. The reverses they sustained, however, showed the necessity for some organization, and the extended service called attention to and developed the value of the foot-soldiers. The invention of gunpowder effected much less change, during the Middle Ages, than is generally supposed. When men could fight at a greater distance than before, and on a system which brought mechanism to the aid of valor, everything connected with the military art underwent a revolution. The art of making good cannon and hand-guns grew up gradually, like other arts; and armies long continued to depend principally on the older weapons,—spears, darts, arrows, axes, maces, swords, and daggers. Each knight sought how he could best distinguish himself by personal valor; and sometimes it happened that the fate of a battle was allowed to depend on

a combat between two knights. Modern Armies. — The Turkish Janissary force, the earliest standing army in Europe. was fully organized in 1362; but the formation of standing armies among Western powers, which may be said to have introduced the modern military system, dates from the es-tablishment of compagnies d'ordonnance by Charles VII of France, nearly a century later. These companies of men-at-arms amounted, with their attendants, to 9,000 men; and to them the king afterward added 16,000 francarchers, largely recruited from the mercenaries which growing wealth and luxury had developed. Monarchs contracted with powerful nobles to raise, by enlistment, regiments, which were now broken up into squadrons or battalions as tactical units, the regiment remaining the administrative unit. Between the beginning of the sixteenth and the end of the eighteenth centuries, the proportion of the musketeers gradually increased; the pike was abandoned for the bayonet, and even the cavalry were taught to rely more on their fire than on the effect of their charge. The improvements in weapons naturally affected the formation. During the Thirty Years' War (1618-48) Gustavus Adolphus and Wallenstein adopted opposite modes of dealing with masses of infantry; the former spread them out to a great width, and only six ranks in depth; whereas the lat-

ter adopted a narrower front, with a depth of twenty to thirty ranks. In Louis XIV's reign, the prolonged wars introduced the larger grouping in brigades and divisions. Frederick the Great, in the next century, reduced the depth of his infantry formation to three ranks, and introduced a most rigid and exact system of tactics and drill. He greatly improved the cavalry tactics, and restored to this arm a reliance on the effect of a rapid charge, while the introduction of horse artillery added to its power.

The French Revolution effected almost as great changes in the military as in the polit-ical organization of Europe. The struggle from which France emerged victorious in 1797 had exhausted even the enormous levies which had fed her armies for the previous five years; and in 1798 a law was passed establishing compulsory military service. Every citizen was declared liable to five years' service, and all between the ages of 20 and 25 were enrolled. The immense advantage which this terrible power gave Napoleon, compelled other nations to follow the example of France, and in Europe voluntary enlistment has since survived in England alone. In spite of the strength which Prussia mustered under Blücher, the teaching of Sadowa and the events of 1870 and 1871 were required to induce the other powers to follow her example. Now, in most nations will be found an army of reserve, intended to augment the standing army, or first fighting line, from a peace to a war strength, and consisting of two classes-those waiting for an immediate call to arms, if required, and those constituting the militia or second line of reserves—the entire effective military power of the state. The principles of organization were also modified in the large armies which took the field in the beginning of the century. In 1792, mixed divisions, composed of all arms, had been introduced, and in 1804 Napoleon organized, under his marshals, corps d'armee, each in itself a complete army. A smaller force taking the field consisting of one corps or less, is generally called an expeditionary force. It should perhaps be added that a corps d'armee takes up on the line of march from 20 to 30 miles, the actual rate of marching may be stated at from 1 to 2 miles an hour, even this rate being dependent on the state of the roads and any circumstances (such as an excessive proportion of guns) that may impede a column of march.

U. S. Army.—By the constitution of the U. S. the president is commander-in-chief of the army and navy of the Union, and Congress has power to raise and support armies, to regulate them, and to provide for executing the laws of the Union, suppress insurrections, and repet invasions. The military history of the U. S. begins with the army of Washington, and the growth has been spasmodic. In 1790, the army as fixed by act of Congress, consisted of 1,216 men. In 1861, at the commencement of the Civil War, the regular force amounted to only 14,000 men. In April of that year, President Lincoln called out 75,000 volunieers for

three months, and in May, 42,000. In July two calls of 500,000 each were authorized by Congress, and it was found necessary to introduce conscription. In October, 1863, a levy of 300,000 was ordered, and in the following February a call for 500,000 was made. In the early part of 1865 two levies amounting in all to 500,000 were made, but were only partially carried out on account of the cessation of hostilities. Thus the total number of men in the army between April, 1861, and April, 1865, amounted to 2,759,050. The Southern states during this time raised an army of about 1,100,000 men, and thus in the whole U.S. was raised the enormous army of nearly 4,000,000 men, or about one eighth of the total population. Within three years from the close of the war, the army had shrunk to a normal strength of 30,000 men. The army of the U. S., June 30, 1896, consisted of 2,171 officers, and 24,784 enlisted men. The U. S. is divided into eight military departments as follows: Department of the East: New England states, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Mississippi, Alabama, Kentucky, Tennessee, Ohio, and District of Columbia; Department of Missouri: Michigan, Missouri, Indiana, Illinois, Wisconsin, Kansas, Arkansas, Indian and Oklahoma Territories; Department of California: California and Nevada; Department of Dakota: Minnesota, South Dakota except so much as lies south of 44th parallel, North Dakota, Montana, and the post of Fort Yellowstone, Wyoming: Department of Texas: Texas; Department of the Platte: Iowa, Nebraska, Wyoming, except post Yellowstone, Idaho, so much as lies east of the lines formed by the extension of the western boundary of Utah and the northeastern boundary of Idaho, and so much of South Dakota as lies south of the 44th parallel; Department of Colorado: Colorado, Utah, Arizona, and New Mexico; Department of Columbia: Oregon, Washington, Idaho and Alaska, excepting so much of Idaho as is embraced in the department of the Platte.

Jan. 1, 1897, the state militias of the states of the Union amounted to the following: Generals, and general staff officers, 1,407; cavalry, 5,061; artillery, 5,058; infantry, 107,450; total actually serving, 118,976; total liable to military duty, 10,149,598. The yearly salary of officers is as follows: major-general, \$7,500; brigadier-general, \$5,500; lieutenant-colonels, \$3,000 which is raised \$300 every five years until they have served fifteen years, when it is raised \$100, making a total of \$4,000 after twenty years of service; major \$2,500, which is raised \$250 every five years; captains, mounted, \$2,000, raised \$200 every five years for twenty years; captains, not mounted, \$1,800, raised \$180 every five years for twenty years: first lieutenant, mounted, \$1,600, raised \$160 every five years for twenty years; first lieutenant, not mounted, \$1,500, raised \$150 every five years for twenty years; second lieutenant, mounted, \$1,500, raised \$150 every five

years for twenty years; second lieutenant, not mounted, \$1,400, raised \$140 every five years for twenty years; the maximum pay of colonels is limited to \$4,500, and lieutenant-colonels to \$4,000. -

The U. S. army is little more than a police force of which a few regiments serve as a reserve to the civil power in the large towns, and the rest are dispersed along the frontier and among the Indian districts. By an act of 1871 the strength of the army was limited to 30,000 men, and consists of 10 regiments of cavalry, each of 12 companies; and 25 regiments of infantry of 10 companies each; 5 regiments of artillery; and one engineer's battalion. Two regiments of cavalry and one of infantry are composed of negroes, but are commanded by white officers. The officers of the army are furnished by the U. S. military academy at West Point.

British Army.— According to the system of localization commenced in 1872, the United Kingdom is divided into 10 military districts, 6 of which are in England, 3 in Ireland, while Scotland makes one by itself. Aldershot, Woolwich, Chatham, and the Curragh are not included in any of these districts. In each district a general officer has command of all the forces within it, including the militia and volunteers. These districts are subdivided into 70 sub-districts called infantry brigade districts, of which 54 are in England, 8 in Scotland, and 8 in Ireland. Each brigade consists of 2 battalions of the line, a brigade depot, 2 battalions of militia, besides the re-serve of the district. The terms of enlistment are either for 12 years' army service (long service), or for 7 years' army service and 5 years' reserve service (short service). After 12 years' service in the army a soldier may be permitted to re-engage for another 9 years, and after the completion of the whole period of 21 years' service is entitled to be discharged with a pension. British soldiers under the rank of a commissioned officer receive payment varying from one shilling a day, which is the pay of a private in an infantry regiment, up to 6 shillings a day, the pay of a regimental sergant-major in the Royal Engineers. According to the regulations now in force, first commissions are given to successful candidates at the Civil Service Commissioners' open examinations; to university students or lieutenants of militia who pass certain examinations; or to noncommissioned officers specially recommended; while promotion is regulated by seniority principally, but partly by selection. The military strength of the British army in 1897 was: regular troops enrolled, home and colonial, 154,-000; grand war total, 570,634.

Germany.— By the imperial constitution of 1871, the Prussian obligation to serve in the army is extended to the whole empire. Every German capable of bearing arms must serve in the army or navy for 12 years — 7 in the standing army (3 with the colors, and 4 in the reserve), and 5 in the landwehr; or corresponding periods in the fleet and seewehr. Afterward he is enrolled in the landsturm until 42 years of age. In the infantry, however, many of the more intelligent men are subjected to only 2 years' training; and "one-year volunteers" are passed into the reserve at the end of their first year, on condition of passing certain examinations, and bearing the expense of their clothing, equipment, etc., for the year. In the German organization the territorial system is carried out thoroughly. The army consists of 18 army corps, 13 of which are Prussian; and each of these is raised, recruited, and stationed within a par-ticular district. These corps districts are divided into divisional and brigade districts. which are subdivided into landwehr battalion districts, and these in turn into company districts, so that every village has its definite place. Each line regiment (3 battalions) draws its recruits from an allotted district, and passes its time-expired men into the landwehr regiment (2 battalions) of the same district. After the exemptions common to all countries have been granted, the ballot allows a margin of about 10 per cent.; those who draw the fortunate numbers passing at once into the Ersatz reserve, which receive no training, but may be called upon to replace casualties in the field.

France.—A law passed in 1872 enacted that every Frenchman, with a few specified exceptions, unless serving in the navy, was liable to personal service in the army, and forbade substitution. The period of liability extended to 20 years, of which 5 were spent in the active army, 4 in the reserve of the active army, 5 in the territorial army, and 6 in the reserve of the territorial army. The expense of keeping up such an establishment in peace, however, led to the division of the recruits by ballot into two classes, one of which served the full 5 years in the active army, while the other was sent home after 6 months' or a year's training. One-year volunteers were also accepted; but so many men joined in that capacity, that, in 1887, a bill was brought before the French legislature abolishing the privilege. In the same year an Army Reorganization Bill was introduced, reducing the period of service with the colors to 3 years, and proposing a large addition to the establishment; the object of the changes being to materially add to the number of efflcients without increasing the military budget. By the law of 1873, France is divided, for military purposes, into 18 regions, each occupied by a corps d'armée, containing 2 divisions of infantry, 1 brigade of cavalry, 1 of artillery, 1 battalion of engineers, and 1 squadron of the military train, and retaining its organi-zation permanently in peace and in war. The corps are not permanently localized, but frequently change stations; and in time of war the region in which a corps happened to be stationed would be drawn on for reserves and stores

Austria. — The military forces of the Austro-Hungarian empire are divided into the standing army, the landwehr, and the landsturm. All subjects are liable to service, and those exempted on physical grounds pay a fine pro-

portionate to their means. In principle every qualified man must serve three years with the colors, 4 in the reserve, 5 in the landwehr, and, by a law passed in 1886, 12 in the landsturm, from which, in time of war, men may be drafted into the landwehr; and men who have passed through the regular army will be liable for service in the landsturm as officers or non-commissioned officers till the age of sixty. In practise, however, financial considerations cause the division of recruits into three classes: about 95,000 annually form the first class, trained as above; nearly 10,000 are drawn to supply the Ersatz reserve; and all the remainder are passed at once into the landwehr, there to serve their The regiments of the standing 12 years. army are under the control of the minister of war of the empire, while the landwehr is controlled by the Austrian and Hungarian minis-ters of national defense. There is no permanent corps organization, the division being the principal unit; but in war, 3 infantry divisions, with a proportion of cavalry and a regiment of artillery, would be joined to form a corps.

Russia.—Universal liability to service has been established since 1870, but, although prohibited, the purchase of exemption has hitherto been permitted, at a fixed rate of 800 roubles (about \$635). The period of service is 15 years; 6 in active service (2 generally on furlough), and 9 in the reserve. The Russian military forces are composed of regular and irregular troops, and militia, only called out to repel invasions. Every man not in the army or reserve belongs to the militia up to his fortieth year. The country has been divided into 15 military districts, with sub-districts and "circles" as in Germany. The number of army corps is 17, with the army of the Caucasus (7 divisions of infantry and 1 of cavalry) in addition. The irregular troops are supplied by the Cossacks, who give military service in lieu of taxes, and comprise about 190,000 men, chiefly cavalry. The want of barrack accommodation leads to a great deal of billeting, and many men stationed in country districts see their officers only in summer, when they are assembled for training in large standing camps.

Italy.-The Sardinian law of conscription forms the basis of the Italian military system, and all are liable from eighteen to forty. Substitution is allowed in the case of brothers, and one-year volunteers are accepted. Contingents are divided by lot into two classes, one enjoying unlimited furlough, and the other serving 8 years in the army, 4 in the active militia, and the rest of their time in the local militia. In infantry regiments 3, in cavalry regiments 5 years only are served with the colors; the remainder, as a rule, being spent on furlough. The kingdom is divided into five "zones," and, in direct opposition to the Prussian principle, recruits are drawn from all zones for each regiment.

Of the other military powers of Europe, the army of Belgium, including the staff and all arms, rank and file, number about 50,000 men, besides the Garde Civique, 40,000; Denmark, 50,000, including the extra reserve of 14,000; Netherlands, 6,000 in Europe, and 31,000 in the East Indies; Spain, 145,000, with 40,000 in the colonies; Sweden, 40,000, besides the conscription troops, 135,000, and the militia, 16,000; in Norway the troops of the line are about 12,000 in peace, and in time of war not more than 18,000 without the consent of the Storthing: Switzerland, 117,000, and the landwehr 4,000; Turkey can be raised by mobilization to 475,000.

Army Worm, the very destructive larva of a moth so called from its habit of marching in compact bodies of enormous number, devouring almost every green thing it meets. It is about 14 in. long, greenish in color, with black stripes, and is found in various parts of the world, but is particularly destructive in North America. The larva of a European two-winged fly is also called army worm.

Arndt (arnt), ERNST MORITZ, German patriot and poet; b. 1769, d. 1860. He was appointed professor of history at Griefswald in 1806, and stirred up the national feeling against Napoleon in his work *Geist der* Zeit (Spirit of the Time). In 1812-13 he zealously promoted the war of independence by a number of pamphlets, poems, and spirited songs, among which it is sufficient to refer to his Was ist des Deutschen Vaterland? Der Gott, der Eisen wachsen lies, and Was blasen die trompeten? Husaren heraus! which were caught up and sung from one end of Germany to the other.

Arne (àrn), THOMAS AUGUSTINE (1710-1778), English composer. To him the British owe the national air, *Rule Britannia*, originally given in a popular piece called the *Masque of* Alfred.

Arn hem (or Arnheim), a town in Holland, province of Gelderland, 18 mi. s.w. of Zutphen,

on the right bank of the Rhine. It manufactures cabinet wares, mirrors, carriages, mathematical instruments, etc.; has paper-mills, and its trade is important. In 1795 it was stormed by the French, who were driven from it by the Prussians in 1813. Pop. 46,233.

Ar'nica, a genus of plants, consisting of some twelve species, one of which is found in Central Europe and in the Western states. Ithas a perennial root, a stem about two feet high, bearing on the summit flowers of a dark golden yellow. In every part of the plant there is an acrid resin

there is an acrid resin Arnica. and a volatile oil, and in the flowers an acrid bitter principle called *arnicia*. The root contains also a considerable quantity of tannin.



A tincture of it is employed as an external application to wounds and bruises.

Ar'no, a river of Italy which rises in the Etruscan Apennines, makes a sweep to the south and then trends westward, divides Florence into two parts, washes Pisa, and falls 4 mi. below it, into the Tuscan Sea, after a course of 130 mi.

Arnold, ARTHUR (b. 1833), an English editor and statesman, brother of Sir Edwin Arnold. He edited the London *Echo*, a liberal newspaper, became connected with the London *Telegraph*, and entered Parliament in 1880. He has written *From the Levant*, and has also published two novels.

Arnold, BENEDICT (1741-1801), b. in Nor-wich, Conn.; d. in London. He had a common school education, and went to New Haven and conducted a book and drug store. He visited Honduras, where he fought a duel with an English captain, provoked by the captain's reflections on New England. In 1767, he married Miss Margaret Mansfield. After the battle of Lexington, Arnold was sent by Massachusetts to lead an expedition for the capture of Crown Point and Ticon-deroga, and on his way thither met Col. Ethan Allen with a company of soldiers devoted to the same purpose. Allen took the lead, to which he was entitled. and captured Ticonderoga on May 10, 1775. Four days later Arnold captured St. John's. In the autumn of the same year Washington dis-patched Arnold with 1,100 men to assist in capturing Quebec. On December 31 he was joined by the corps of General Montgomery, and a combined attack was made. The American army was defeated, Montgomery killed, and Arnold's leg fractured. Congress promoted him to the rank of brigadier-general. On Oct. 11, 1776, he fought a naval battle with a force of the British, during which he ran his own vessel ashore, burnt her, and with his other ships retreated to Ticonderoga. In 1777, congress appointed five major-generals for the army, all of whom were juniors of Arnold. He was stung by this injustice, and Washington wrote to assure him that he would endeavor to remedy "the error." On presenting his claims for advancement in rank, Congress voted him thanks, but did not promote him. Arnold resigned, but his resignation was not accepted. At that time Washington urged Congress to send Arnold north to head off General Burgoyne. Arnold consented to serve. He joined Gen. Philip Schuyler, and led an expedition to relieve Fort Stanwix, then besieged by a force of British and Indians. He returned to the main army, and took part in the first battle of Bemis Heights, October 19, 1777. Arnold then joined General Washington, and soon after Congress sent him his commission as majorgeneral. In June, 1778, he was appointed to the command of Philadelphia. He became involved in quarrels with the authorities of Pennsylvania. He was tried by court-martial but was acquitted of intentional wrong-doing, though in some respects his conduct was de-

clared improper. The sentence was that he should receive a reprimand from the com-mander-in-chief. Washington discharged this duty with considerable reluctance, and assured him of his continued esteem and the high estimate he placed on his services. Arnold's first wife had died recently, and he married Miss Margaret Shippen, a daughter of Chief Justice Shippen of Pennsylvania. Through this marriage he was brought into connection with several Tory families, and a correspondence was opened with Sir Henry Clinton. In 1780 Arnold visited the camp of Washington, and was tendered the command of the left wing of the army. He declined on the pretense of inability to perform service in the field, on account of the wound received at Saratoga. Instead he desired the command at West Point, on which he entered in 1780. Arnold's treachery became manifest through the capture of Major André, and he escaped to New York City. He was compensated with a British brigadier-general's commission and a sum of money. Early in 1781, at the head of a British force, he led a raid into Virginia. and made an attack on New London. He went to London in 1782. In 1797 the British Government gave him 13,400 acres of land in Canada. All his sons received commissions in the British army. But Arnold was despised and shunned even by the British, and died in obscurity

Arnold, EDWIN, SIR, a British poet, Sanskrit scholar, and journalist, b. 1832. In 1861 he joined the editorial staff of the Daily Telegraph, with which he has ever since been connected. He is author of poems, narrative and lyrical, numerous translations from the Greek and Sanskrit; The Light of Asia, a poem presenting the life and teaching of Guatama, the founder of Buddhism; Pearls of the Faith; Lotus and Jewel; etc.

Arnold, ISAAC NEWTON (1815-1884), b. in Oswego co., N. Y., was admitted to the bar in 1835. He moved to Chicago, of which, in 1837, he became the first city clerk. In 1842-43 he was a member of the Illinois legislature, and again in 1856. He served in Congress as a Republican 1860-65. In 1867 he published *The* Life of Abraham Lincoln, and in 1880 The Life of Benedict Arnold. He was for several years president of the Chicago Historical Society, and published pamphlets on the early history of Illinois.

Arnold, MATTHEW (1822-1888), English critic, essayist, and poet, was b. at Laleham, near Staines, being a son of Dr. Arnold of Rugby. He was the author of many essays and poems of much merit.

Arnold, THOMAS (1795-1842), an English educator. In 1828 he was appointed head-master of Rugby School. His success was remarkable. Not only did Rugby School become crowded beyond any former precedent, but the superiority of Dr. Arnold's system became so generally recognized that it may be justly said to have done much for the general improvement of the public schools of England. In 1841 he was appointed professor of modern

history at Oxford. His chief works are his edition of *Thucydides*, his *Roman History*, and his *Sermons*.

Arnsberg (årnz'berk), a town in Prussia, prov. Westphalia, capital of the government of same name, on the Ruhr. Pop. 6,733.— The government of Arnsberg has an area of 2,972 sq. mi., and a population of 1,189,688.

Ar'null, great grandson of Charlemagne, elected king of Germany A. D. 887; invaded Italy, captured Rome, and was crowned emperor by the pope (896); d. A. D. 889.

Aromat'ics, drugs, or other substances which yield a fragrant smell, and often a warm, pungent taste, as calamus, ginger, cinnamon, cassia, lavender, rosemary, laurel, nutmegs, cardamoms, pepper, pimento, cloves, vanilla, saffron. Some of them are used medicinally as tonics, stimulants, etc.

**Arpad** (ar-päd') (870-907), the hero of Hunt garian ballad and romance, founder of the kingdom of Hungary. The Arpad dynasty reigned till 1301.

**Årpino** (ar-pē'nō), a town of southern Italy, province of Caserta, celebrated as the birthplace of Caius Marius and Cicero. It manu factures woolens, linen, paper, etc. Pop. 11,535.

Ar'quebus, a hand-gun; a species of firearm resembling a musket, anciently used. It was fired from a forked rest, and sometimes cocked by a wheel, and carried a ball that weighed nearly two ounces. A larger kind used in fortresses carried a heaver shot.

Ar'rah, a town of British India, in Shahabad district, Bengal, rendered famous during the mutiny of 1857 by the heroic resistance of a body of twenty civilians and fifty Sikhs, cooped up within a detached house, to a force of 3,000 sepoys, who were ultimately routed and overthrown by the arrival of a small European reinforcement. Pop. 42,008.

Ar'ran, an island of Scotland, in the Firth of Clyde, part of Bute county. Area 165 sq. mi. It is of a wild and romantic appearance, particularly the northern half, where the island attains its loftiest summit in Goatfell, 2,806 feet high. The geology of Arran has attracted much attention, as furnishing within a comparatively narrow space distinct sections of the great geological formations; while the botany possesses almost equal interest, both in the variety and the rarity of many of its plants.

Arras (å-rä), a town of France, capital of the department Pas-de-Calais, with several handsome squares and a citadel, cathedral, public library, botanic garden, museum, and numerous flourishing industries. In the Middle Ages it was famous for the manufacture of tapestry, to which the English applied the name of the town itself. Pop. 27,041.

Arrest of Judgment, in law, the staying or stopping of a judgment after verdict, for causes assigned. Courts have power to arrest judgment for intrinsic causes appearing upon the face of the record; as when the declaration varies from the original writ; when the verdict differs materially from the pleadings; or when the case laid in the declaration is not

### Arsenic '

sufficient in point of law to found an action upon.

Ar'ria, the heroic wife of a Roman named Cæcina Pætus. Pætus was condemned to death in 42 A. D., for his share in a conspiracy against the emperor Claudius, and was encouraged to suicide by his wife, who stabbed herself and then handed the dagger to her husband with the words, "It does not hurt, Pætus!"

Arrowroot, a starch largely used for food and for other purposes. Arrowroot proper is obtained from the rhizomes or root-stocks of several species of plants, and perhaps owes its name to the scales which cover the rhizome, which have some resemblance to the point of an arrow. Some, however, suppose that the



Arrowroot

name is due to the fact of the fresh roots being used as an application against wounds inflicted by poisoned arrows, and others say that arrow is a corruption of ara, the Indian name of the plant. Brazilian arrowroot or tapioca meal, is got from the large, fleshy root of another variety, after the poisonous juice has been got rid of; and Oswego arrowroot from Indian corn.

Ar'ru (or Aroo) **Islands**, a group belonging to the Dutch, s. of western New Guinea, and extending from north to south about 127 mi. They are composed of coralline limestone, nowhere exceeding 200 feet above the sea, and are well wooded and tolerably fertile. The natives belong to the Papuan race, with an intermixture of foreign blood, and are partly Christians. The chief exports are trepang, tortoise-shell, pearls, mother-of-pearl, and edible birds'-nests. Pop. of group about 20,000.

Ar'senk, a metallic element of very common occurrence, being found in combination with many of the metals in a variety of minerals. It is of a dark-gray color, and readily tarnishes on exposure to the air, first changing to yellow, and finally to black. In hardness it equals copper; it is extremely brittle, and very volatile, beginning to sublime before it melts. It burns with a blue flame, and emits a smell of garlic. It forms alloys with most of the metals. Combined with sulphur it forms orpiment and realgar, which are the yellow and red sulphides of arsenic. With oxygen, arsenic forms two compounds, the more important of which is arsenious oxide or arsenic trioxide, which is the white arsenic, or simply arsenic of the shops. It is usually seen in white glassy, translucent masses, and is ob-tained by sublimation from several ores containing arsenic in combination with metals, particularly from arsenical pyrites. Of all substances arsenic is that which has most frequently occasioned death by poisoning, both by accident and design. The best remedies against the effects of arsenic on the stomach are hydrated sesquioxide of iron or gelatinous hydrate of magnesia, or a mixture of both, with copious draughts of bland liquids of a mucilaginous consistence, which serve to procure its complete ejection from the stomach. Oils and fats generally, milk, albumen, wheat-flour, oatmeal, sugar or syrup, have all proved use-ful in counteracting its effect. Like many other virulent poisons it is a safe and useful medicine, especially in skin diseases, when ju-diciously employed. It is used as a flux for glass, and also for forming pigments. The arsenite of copper and a double arsenite and acetate of copper (emerald green) are largely used by painters; they are also used to color paper-hangings for rooms, a practise not unaccompanied with considerable danger, especially if flock-papers are used or if the room is a confined one. Arsenic has been too frequently used to give that bright green often seen in colored confectionery, and to produce a green dye for articles of dress and artificial flowers.

Arsin'oe, a city of ancient Egypt on Lake Mœris, said to have been founded about B. C. 2300, but renamed after Arsinoë, wife and sister of Ptolemy II, of Egypt, and called also Crocodilopolis, from the sacred crocodiles kept at it.

Ar'son, in common law, the malicious burning of a dwelling-house or outhouse of another man, which by the common law is felony, and which, if homicide result, is murder. Also, the wilful setting fire to any church, chapel, warehouse, mill, barn, agricultural produce, ship, coal-mine, and the like. In the U.S. and Great Britain it is a considerable aggravation if the burning is to defraud insurers.

Art, in its most extended sense, as distinguished from nature on the one hand and from science on the other, has been defined as every regulated operation or dexterity by which organized beings pursue ends which they know beforehand, together with the rules and the result of every such operation or dexterity. In this wide sense it embraces what are usually called the useful arts. In a narrower and purely æsthetic sense it designates what is more specifically termed the fine arts, as architecture, sculpture, painting, music, and poetry. The useful arts have their origin in positive practical needs, and restrict themselves to satisfying them. The fine arts minister to the

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sentiment of taste through the medium of the beautiful in form, color, rhythm, or harmony. See *Painting, Sculpture*, etc. In the Middle Ages it was common to give certain branches of study the name of arts.

Artaxerx'es ("the mighty"), the name of several Persian kings.—1. ARTAXERXES, surnamed LONGIMANUS, succeeded his father, Xerxes I, B. C. 465. He subjected the rebellious Egyptians, terminated the war with Athens, governed his subjects in peace, and d. B. C. 425.—2. ARTAXERXES, surnamed MNEMON, succeeded his father, Darius II, in the year 405 B. C. After having vanquished his brother Cyrus he made war on the Spartans, who had assisted his enemy, and forced them to abandon the Greek cities and islands of Asia to the Persians. On his death, B. C. 330, his son Ochus ascended the throne under the name of—3. ARTAXERXES OCHUS (359 to 339 B. C.). After having subjected the Phœnicians and Egyptians, and displayed great cruelty in both countries, he was poisoned by his general Bagoas.

Ar'temis, an ancient Greek divinity, identified with the Roman Diana. She was the daughter of Zeus (Jupiter) and Leto (or Latona), and was the twin sister of Apollo, born in the island of Delos. She is variously represented as a huntress, with bow and arrows; as a goddess of the nymphs, in a chariot drawn by four stags; and as the moon goddess, with the crescent of the moon above her forchead. She was a maiden divinity, never conquered by love, except when Endymion made her feel its power. She demanded the strictest chastity from her worshipers, and she is represented as having changed Actwon into a stag. and caused him to be torn in pieces by his own dogs, because he had secretly watched her as she was bathing.

Artemi'sia, Queen of Caria, in Asia Minor, about 352-350 B. C., sister and wife of Mausolus, to whom she erected in her capital Halicarnassus, a monument called the Mausoleum, which was reckoned among the seven wonders of the world.

Artemi'sium, a promontory in Eubœa, an island of the Ægean, near which several naval battles between the Greeks and Persians were fought, B. c. 480.

Ar'temus Ward (CHARLES FARRAR BROWNE) (1834-1867), an American humorist, b. at Waterford, Maine, d. at Southampton, England. Originally a printer, he became editor of papers in Ohio, where his humorous letters became very popular. He subsequently lectured on California and Utah in the U. S. and in England, where he contributed to *Punch*. His writings consist of letters and papers by Artemus Ward, a pretended exhibitor of wax figures and wild beasts, and are full of drollery and eccentricity.

Ar'teries, the system of cylindrical vessels or tubes, membranous, elastic, and pulsatile, which convey the blood from the heart to all parts of the body, by ramifications which as they proceed diminish in size and increase in number, and terminate in minute capillaries uniting the ends of the arteries with the beginnings of the veins. See Anatomy.

Arte' sian Wells, so called from the French province of Artois, where they appear to have been first used on an extensive scale, are perpendicular borings into the ground through which water rises to the surface of the soil, producing a constant flow or stream, the ultimate sources of supply being higher than the mouth of the boring, and the water thus rising by the well-known law. They are generally sunk in valley plains and districts where the lower previous strata are bent into basin-shaped curves. The rain falling on the outcrops of these, saturates the whole porous bed, so that when the bore reaches it the water by hydraulic pressure rushes up toward the level of the highest portion of the strata. The supply is sometimes so abundant as to be used extensively as a moving power, and in arid regions for fertilizing the ground, to which purpose artesian springs have been applied from a very remote period. Thus many artesian wells have been sunk in the Algerian Sahara which have proved an immense boon to the district. The water of most of these is potable, but a few are a little saline, though not to such an extent as to influence vegetation. The hollows in which London and Paris lie are both perforated in many places by borings of this nature. One of the most celebrated artesian wells is that of Grenelle, near Paris, 1,798 feet deep, completed in 1841, after eight years' work. One of the deepest is at Rochefort, in France, 2,765 feet. Wells of great depth are also found in America. As the temperature of water from great depths is invariably higher than that at the surface, artesian wells have been made to supply warm water for heating manufactories, greenhouses, hospitals, fish-ponds, etc. The oil wells of America are of the same technical description. These wells are now made with larger diameters than formerly, and altogether their construction has been rendered much more easy in modern times.

The process of boring artesian wells, drivewells, oil. or gas-wells has become a distinct branch of hydraulic engineering. In driving a tube well either a horse-power machine or a steam engine is used as power. A hole is bored for some distance and cased with an iron pipe which is driven into the hole by means of a drill-rod which may be lengthened from time to time by screwing sections onto it. The drill-rods are made of iron pipe, and about every 30 feet in the hollow drill-rod is a valve which opens from underneath. In the drill at the bottom of the rod is a hole, and as the drill is lifted and dropped alternately by the mechanism on the ground, water is poured into the well, forming a slush of the crushed earth, clay, or gravel, which enters the drill rod through a hole in the drill. When the drill is lifted the rods containing the water and slush are raised, the drill is dropped suddenly and the slush and water pass into the next section above through the valves, which close when the drill is again raised. Thus the

drillings are lifted to the surface and are there discharged. As fast as the drill crushes its way deeper into the earth, iron casing is driven down. A pump is always attached to the head of the apparatus and started when water is reached. The sand in the gravel bed is pumped out, thus forming a reservoir in the clean gravel. Another method is known as the rolling and jetting process. This com-bines the principles of hydraulic mining and the diamond drill. A diamond drill cuts its way into the earth and rock by revolving a drill point studded with black diamonds. ĺn the rolling and jetting system used, the cutter is a section of pipe on the lower end of which teeth are cut. This is revolved in the ground by a machine which grips the pipe. Jets of water are forced down inside of the pipe, the water rushes out from under the cutter's teeth and returns to the surface on the outside of the pipe, thus forming a water cushion between the pipe and the earth and lessening the friction. Whenever a material is struck which is too hard to be cut by the steel cutter, a cutter set with black diamonds is used. Enormous augers, which bore holes from 8 to 30 inches in diameter, are used to sink shallow wells. Wells more than 60 feet deep are almost universally bored with well-driving machinery. In boring shallow wells a large auger is fixed to the end of a vertical shaft Such wells are cased and twisted around. with stone or brick.

Arteveld (Artevelde)(år' te-velt, år' te-vel-de), the name of two men distinguished in the history of the Low Countries. 1. JACOB VAN, a brewer of Ghent, b. about 1300; was selected by his fellow townsmen to lead them in their struggles against Count Louis of Flanders. In 1338 he was appointed captain of the forces of Ghent, and for several years exercised a sort of sovereign power. A proposal to make the Black Prince, son of Edward III of England, governor of Flanders, led to an insurrection, in which Arteveld lost his life. (1345). 2. PHLIP, son of the former, at the head of the forces of Ghent, gained a great victory over the Count of Flanders, Louis II, and for a time assumed the state of a sovereign prince. Arteveld fell with 25,000 Flemings at Rooseboke in 1382.

Arthur, CHESTER ALAN (1830-1886), twentyfirst president of the U. S.; the son of Scottish parents, his father being pastor of Baptist churches in Vermont and New York. He chose law as a profession, and practised in New York. As a politician he became a leader in the Republican party. During the Civil War he was energetic as quartermaster general of New York in getting troops raised and equipped. He was afterward collector of customs for the port of New York. In 1880 he was elected vice-president, succeeding as president on the death of Garfield in 1881.

Ar'thur, KING, an ancient British hero of the sixth century, son of Uther Pendragon, and the Princess Igerna, wife of Gorlois, duke of Cornwall. He married Guinevere (or Ginevra); established the famous order of the

-11

#### Arthur

Round Table; and reigned twelve years in peace. After this he conquered Denmark, Norway, and France, and went to Rome. While away, Modred, his nephew, stirred up his subjects to rebellion. He subdued the rebels, but died in consequence of his wounds, on the island of Avalon. The story of Arthur is supposed to have some foundation in fact.

Arthur, TIMOTHY S. (1809–1885), born in Orange co., N. Y. He wrote many popular domestic tales, and founded Arthur's Home Magazine.

Arthur's Seat, a picturesque hill near Edinburgh, Scotland; altitude 822 feet. It is composed of a diversity of eruptive rocks, with some interposed and uptilted sedimentary ones; and derives its name from the legendary King Arthur.

Artichoke, a well-known plant somewhat resembling the thistle, with large, divided, prickly leaves. The erect flower-stem terminates in a large, round head of numerous



#### Artichoke.

imbricated oval, spiny scales which surround the flowers. The fleshy bases of the scales, with the large receptacle, are the parts that are eaten. The Jerusalem artichoke is a species of sunflower, whose roots are used like potatoes.

Articles, The THIRTY-NINE, of the Church of England, a statement of the particular points of doctrine, thirty-nine in number, maintained by the English Church; first promulgated by a convocation held in London in 1562-63, and confirmed by royal authority; founded on, and superseding, an older code issued in the reign of Edward VI. They were ratified anew in 1604 and 1628. All candidates for ordination must subscribe to these articles. This formulary is now accepted by the Episcopalian Churches of Scotland, Ireland, and America.

Articula'ta, the third great section of the animal kingdom, according to the arrangement of Cuvier, including all the invertebrates with the external skeleton forming a series of rings articulated together and enveloping the body, distinct respiratory organs, and an internal ganglionated nervous system along the middle line of the

# Artifical Limbs

body. They are divided into five classes. The first four classes are now commonly placed together under the name of *Arthrop*oda, and the whole are sometimes called Arthrozoa.

Articula tion, in anatomy a joint: the joining or juncture of the bones. This is of three kinds: 1, a movable connection, such as the ball-and-socket joint; 2, immovable connection, as by suture, or junction by serrated margins; 3, union by means of another substance, by a cartilage, tendon, or ligament.

Artificial Limbs are made principally of extra fine close-grained wood of the English weeping willow. Within the last few years aluminum has come into use to a considerable extent and is particularly valuable on account of its lightness, strength, and non-corrosive quality. When made of wood, the piece is first turned in the lathe to the general shape of a leg or arm and then hollowed out until the shell is from one fourth to five eighths of an inch thick. It is then whittled down to the general shape required, when the proper angles and depression in the top of the inside portion are cut so that it will exactly fit the stump for which it is intended. Upon the accuracy of this fit depends the comfort which the wearer will take with it. The foot is whittled out by hand entirely, and fastened to the leg by means of a hinge, and the more expensive pieces have another hinge fitted up for the toes. When the amputation is above the knee an-

other hinge is prepared for the knee-joint so that the leg will swing readily in walking. After the wooden pieces have been completed and polished a fine piece of rawhide is shrunk over them and fastened by means of glue. As it dries it shrinks and adds much strength, and does not increase the The weight materially. bottom of the foot is made of soft rubber for the purpose of giving a natural spring in walking. After the leg has been painted it is ready for use. Limbs are attached usually by means of leather bands which may be laced tight, or they are held up by straps running over the



Artificial Leg.

shoulders like suspenders. Arms are often so fitted that the hand may be unscrewed and a knife or fork, or hair brush, made especially for the purpose, can be put in its place. Deformed feet are often pieced out with blocks of wood whittled to the proper shape. An ordinary artificial hand of the best make is worth about \$100, legs from \$50 to \$125, and arms from \$50 to \$150. Under the general head of the manufacture of artificial limbs is included the manufacture of ears, fingers and noses. A nose for instance is first molded

in the proper shape from papier maché. It is then waxed and varnished to the tint of the complexion of the noseless person. It is fastened on by means of a pair of spectacles to the nose piece, to which it is firmly at-tached, or where the remaining stump is large enough, it is clamped in place. Ears are made in the same way but are more difficult to attach. They are usually attached by means of small springs which fit into the ear duct. Artificial eyes are made of glass. First a bulb is blown from molten glass and when cold one side is carefully broken off so as to leave a shell, the edges of which are blunted by melting. The proper size of eye is secured by measurement and the eye designed is worked by placing the bulb over a Bunsen burner so that its upper surface will just touch the flame. In this way little sticks of varied colored glass are worked into the eye design. Great skill is required to made the iris and the retina of the proper color and shape.

Artil'lery, all sorts of great guns, cannon, or ordnance, mortars, howitzers, machine-guns, etc., together with all the apparatus and stores thereto belonging, which are taken into the field, or used for besieging and defending fortified places. The improvements and alterations in artillery and projectiles have of late years been extraordinary. The most important modern improvement in artillery, besides the increase in size, is the general adoption of rifled ordnance, breech-loaders, and machine-guns. See *Cannon* and other articles. The name artillery is also given to the land troops by whom these arms are served, whether they accompany an army in the field, take part in sieges, or occupy fixed posts.

**Artois** (år-twä), a former province of France, anciently one of the seventeen provinces of the Netherlands, now almost completely included in the department of Pas de Calais.

Arts, the name given to certain branches of study in the Middle Ages, originally called the "liberal arts" to distinguish them from the "servile arts" or mechanical occupations. These arts were usually given as grammar, dialectics, rhetoric, music, arithmetic, geometry, and astronomy. Hence originated the terms "art classes," "degrees in arts," "Bachelor of Arts." "Master of Arts," etc., still in common use in universities, the faculty of arts being distinguished from those of divinity, law, medicine, or science.

Arundelian *l'iarbles*, a series of ancient sculptured marbles discovered by William Petty, who explored the ruins of Greece at the expense of and for Thomas Howard, earl of Arundel, who lived in the time of James I and Charles I, and was a liberal patron of scholarship and art. After the Restoration they were presented by the grandson of the collector to the University of Oxford. Among them is the Parian Chronicle, a chronological account of the principal events in Grecian, and particularly in Athenian history, during a period of 1,318 years, from the reign of Cecrops (B. c. 1450) to the archonship of Diognetus (B. c. 264).

**Aruwimi,** a large river of equatorial Africa, a tributary of the Congo, which it enters from the north.

Arval Brothers, a college or company of twelve members elected for life from the highest ranks in ancient Rome, so called from offering annually public sacrifices for the fertility of the fields.

Arvic'oia, a genus of rodent animals, suborder Mice. It includes the water-vole (or water-rat), and the field-vole or short-tailed field-mouse.

A'ryan (or Indo-European Family of Languages). See Indo-European Family.



As, a Roman weight of 12 oz., answering to the libra or pound, and equal to 237.5 grains avoirdupois, or 327.1873 grams, French measure. In the most ancient times of Rome the copper or bronze coin which was called *as*, actually weighed an *as*, or a pound, but in 264 B. c. it was reduced to 2 oz., in 217 to 1 oz., and in 191 to  $\frac{1}{2}$  oz.

A'sa, great grandson of Solomon and third king of Judah. He died after a prosperous reign of 41 years.

reign of 41 years. Asafet'ida (asafœtida), a fetid inspissated sap from Central Asia, the solidified juice of a large umbelliferous plant. It is used in medicine as an anti - spasmodic, and in cases of flatulency, in hysteric paroxysms, and other nervous affections. Notwithstanding its very disagreeable odor it is used as a seasoning in the East, and sometimes in Europe.

A'saph, a Levite and psalmist appointed by David as leading

Ferula Asafetida.

chorister in the divine services. He founded a school of poets and musicians, which were called, after him, "the sons of Asaph."

Asarabac'ca, a small, hardy European plant. Its leaves are acrid, bitter, and nauseous, and its root is extremely acrid. Both the leaves and root were formerly used as an emetic. The Canada snake-root is found in the western states.

Asben (Air, or Ahir), a kingdom of Africa.


in the Sahara. The inhabitants are Tuaregs (or Berbers), with an admixture of negro blood. They live partly in villages, partly as nomads. It is nominally ruled over by a sultan, who resides in the capital, Agades. Pop. about 60,000.

Asbes' tos (asbestus), a remarkable and highly useful mineral, a fibrous variety of several members of the hornblende family, composed of separable filaments, with a silky luster. The fibers are sometimes delicate, flexible, and elastic; at other times stiff and brittle. It is incombustible, and anciently was wrought into a soft, flexible cloth, which was used as a shroud for dead bodies. Some varieties are compact and take a fine polish, others are loose, like flax or silky wool. Mountain-wood is a variety presenting an irregular filamentous, structure, like wood. Rock-cork, mountain-leather, fossil-paper, and fossil-flax, are varieties.

Asbestos is always found in connection with a hard, crystal-like substance. The veins of asbestos as found in the mines are from two to four inches in thickness and separated by thin layers of hornblende crystals. The nearer to the surface the veins run the coarser are the The fibers and therefore the less valuable. most improved quarrying machinery is used in mining asbestos. Holes are drilled in long rows into the sides of the cliffs by means of steam drills. These holes are then loaded with dynamite and exploded simultaneously by electricity, thus a whole section of an asbestos cliff is broken off in one lump. The workmen break out as much of the pure asbestos as possible and convey it by means of trucks to the "cob house." Here the asbestos is separated from the pieces of rock and placed in rough bales and shipped to the factory. The proportion of asbestos in the amount of material quarried is about 1 to 25. As asbestos comes from the mines it is in small lumps of a greenish or yellowish hue and the edges are furred with loose fibers. The best grades of asbestos are nearly white. Another important item is the length of the fibers, the longest being the most valuable. After the asbestos, roughly baled, reaches the factory, it is dumped into hoppers of powerfully built machines and there crushed through a series of rolls until the fibers are separated into fluffy masses when it passes out into a separator where the small pieces of stone and dirt are extracted. The short fibers are taken out and sent to the pulp mill where they are ground up fine for the manufacture of solid packing for steam pistons, mill-board, and other commodities. The long fibers are gathered together, carded, and spun into yarn, just like cotton or wool, after which the substance may be woven into cloth as desired. Asbestos cloth is of a dirty white color and has a soapy feeling.

Asbestos has been known for ages as mountain cork or mountain leather, but its geological history and formation is still a matter of conjecture. Its attributes, too, have been known; but until about twenty years ago, very little practical use has been made of the substance. To-day it forms one of the giant industries of the U.S. The uses of asbestos are many and Ground fine and combined with colvaried. ors and oils in a certain manner it makes a paint. Roofs are made by treating strong canvas with a combination of asbestos and felt, and backing it with manilla paper. It is extensively used for roofs of factories, railroad shops, bridges, and other places where there is danger of fire. Steam-pipes are covered with asbestos, and asbestos cement is used for hotblast pipes and fire-heated surfaces. It is used for locomotive pistons, valve-stems, and oil pumps. It is made into ropes and millboards, and in some states, theaters are required to use an asbestos drop curtain to protect the audience in case of a fire in the scenery. Iron and glass workers use mittens knit from asbestos yarn. Asbestos soldering blocks are used by goldsmiths. Asbestos, in combination with rubber, is much used as an electrical insulator. Asbestos cloth is used for acid filters in all sorts of chemical processes for the reason that no acid will eat it. Asbestos is found in Italy and Canada, and rich deposits have recently been found in Wyoming, California, and Montana. At present Canada is the principal source of supply. A good asbestos mine is considered to be worth more than a gold mine; and as new uses for the substance are found, it becomes more valuable.

Asbjornsen (ås'byeurn-sen), PETER KRIS-TEN, b. 1812, d. 1885, a distinguished Norwegian naturalist and collector of the popular tales and legends, fairy stories, etc., of his native country.

Asbury Park, a small town on the coast of New Jersey, a great summer resort, its population being in summer increased from 4,000 to 20,000 or 25,000.

Asbury, FRANCIS (1745-1846), M. E. bishop, b. in Handsworth, England, d. in Spottsylvania, Va. He was the first bishop of the M. E. church ordained in this country. He came as a missionary to this country. He came as a made general assistant to John Wesley. In 1777 the ministers of his church, at a conference in Maryland, decided that they should return to Europe; Asbury, alone, chose to remain. He was unanimously elected bishop and consecrated by Doctor Coke, 1784, with a fixed salary of \$64 per year. His annual travels extended from Canada to the Mississippi River.

As'calon (or Ash'kelon), a ruined town of Palestine, on the seacoast, 40 mi. w.s. w. of Jerusalem. It was occupied by the Crusaders under Richard I after a great battle with Saladin (1192).

Asca' nius, the son of Æneas and Creusa, and the companion of his father's wanderings from Troy to Italy.

Ascen'sion (discovered on Ascension Day), an island of volcanic origin belonging to Britain, near the middle of the South Atlantic Ocean, 800 mi. n. w. of St. Helena. Area about 36 sq. mi.: pop. 165. It is retained by Britain mainly as a station at which ships may

touch for stores. It has a steam factory, naval and victualing yards, hospitals, and a coal depot.

Ascension, Right, of a star, in astronomy, the arc of the equator intercepted between the first point of Aries and that point of the equator which comes to the meridian at the same instant with the star.

Ascension Day, the day on which the ascension of the Saviour is commemorated, often called *Holy Thursday*; a movable feast, always falling on the Thursday but one before Whitsuntide.

Ascham (as'kam), ROGER (1515-1568), a learned Englishman, born in Yorkshire. He became Latin secretary to Edward VI and also to Mary. Was preceptor to Elizabeth during her girlhood and her secretary after she ascended the throne. In 1544 he wrote a book in praise of his favorite amusement and exercise-archery. In 1563-68 he wrote his Schoolmaster, a treatise on the best method of teaching children Latin. His life was written by Dr. Johnson to accompany an edition of his works published in 1769.

Aschersleben (åsh'erz-la-ben), a town of Prussian Saxony, in the district of Magdeburg, near the junction of the Eine with the Wipper. Industries: woolens, machinery, and metal goods, sugar, paper, etc. Pop. 21,519.

Ascid'ia, the name given to the "Sea-squirts" or main section of the Tunicata, molluscous animals of low grade, resembling a double-



Compound Ascidian.

piration, the other is the excretory aperture. A single ganglion represents the nervous system, placed between the two apertures. Male and female reproductive organs exist in each ascidian. They pass through peculiar phases of development, the young ascidian appearing like a tadpole-body. They may be single or simple, social or compound.

One of the

Ascle' piades (-dez), the name of a number of ancient Greek writers—poets, grammarians, etc. - of whom little is known, and also of several ancient physicians, the most celebrated of whom was AscLEPIADES, of Bithynia, who acquired considerable repute at Rome about the beginning of the first century B. C.

Ascle plas (or Swallow-wort), a genus of plants, the type and the largest genus of the natural order Asclepiadaceae. Most of the species are North American herbs, having opposite, alternate, or verticillate leaves. Many of them possess powerful medicinal qualities. One is diaphoretic and sudorific, and has the singular property of exciting general perspiration without increasing in any sensible degree

the heat of the body; another is emetic, and its roots are frequently sent to England as ipecacuanha; the roots of a third are famed for diaphoretic properties.

As'coli (or Ascoli Piceno), a town in middle Italy, capital of the province of the same name. Pop. 11,199. The province has an area of 809 sq. mi.; a pop. of 222,146.

As gard (lit. gods' yard, or the abode of the gods), in Scandinavian mythology, the home of the gods or *Æsir*, rising, like the Greek Olympus, from *midgard*, or the middle world, that is, the earth.

Ash, a genus of deciduous trees, having imperfect flowers and a seed-vessel prolonged into a thin wing at the apex. There are a good many species, chiefly indigenous to Europe and North America. It is one of the most useful trees on account of its hard, tough wood and the rapidity of its growth. There are many varieties of it, as the weeping ash, the curled-leaved ash, the entire-leaved ash, etc. The flowering, or manna-ash, is a native of the south of Europe and Palestine. It yields the substance called manna, which is obtained by making incisions in the bark. when the juice exudes and hardens. Among the American species are the white ash, with lighter bark and leaves; the red or black ash, with a brown bark; the black ash, the blue ash, the green ash, etc. They are all valuable The mountain-ash or rowan belongs to trees. a different order.

Ash (Ashes), the incombustible residue of organic bodies (animal or vegetable) remaining after combustion; in common usage, any incombustible residue of bodies used as fuel; as a commercial term, the word generally means the ashes of vegetable substances, from which are extracted the alkaline matters called potash, pearl-ash, kelp, barilla, etc.

Ashan'go, a region in the interior of Southern Africa, belonging now to the French. The inhabitants belong to the Bantu stock, and among them are a dwarfish people, the Obongo,

said to be about 44 feet high at most. Ashantee', a kingdom of West Africa, in the interior of the Gold Coast. Area about 70,000 sq. mi. Gold is abundant, being found either in the form of dust or in nuggets. The Ashantees are warlike and ferocious, with a love of shedding human blood **amounting to a** passion, human sacriflees being common. The The government is a despotic monarchy. chief town is Coomassie, which, before being burned down in 1874, was well and regularly built with wide streets, and had from 70,000 to 100,000 inhabitants. The British first came in contact with the Ashantees in 1807, and hostilities continued, off and on, till 1826, when they were driven from the seacoast. Immediately after the transfer of the Dutch settlements on the Gold Coast to Britain in 1872when the entire coast remained in British hands—the Ashantees reclaimed the sovereignty of the tribes round the settlement of Elmina. This brought on a sanguinary war, leading to a British expedition in 1874, in which Coomassie was captured, and British

supremacy established along the Gold Coast. In 1896 another expedition became necessary and was successfully concluded. King Prempeh was deposed and imprisoned and the country annexed. Pop. est. at between 1,000-000 and 2,000,000.

Ash burton Treaty, a treaty concluded at Washington, 1842, by Daniel Webster and Lord Ashburton. It defined the n. e. boundaries between the U. S. and Canada.

Asheville, Buncombe co., N. C., near French, Broad, and Swannanoa rivers, 140 mi. e. of Knoxville. Railroad: Southern. Industries: cotton mills, flouring mill, two iron foundries, cigar and furniture factories, and saw mill. Surrounding country mostly agricultural. The town was first settled in 1794, and was then called Morris, but was shortly afterward changed to its present name in honor of Governor Ashe. Was incorporated in 1833. Pop. est. 1897, 14,000.

Ashland, Schuylkill co., Pa., 120 mi. s.w. of Philadelphia. Railroads: Philadelphia & Reading, and Lehigh Valley. Industries: steam pump works, flour mill, two iron foundries, two screen factories, three planingmills, shoe and shirt factories, and powdermill. Surrounding country partly agricultural, largely anthracite coal mining. The town was first settled in 1847 and became a borough in 1857. Pop. est. 1897, 8,000.

Ashland, Ashland co., Wis., on Lake Superior, has rapidly increased in population; a prosperous town. Pop. 9,956.

Ashton-under-Lyon, a town of Lancashire, England. The chief employment is the cotton manufacture and iron-works. Pop. 10,494.

manufacture and iron-works. Pop. 10,494. Ashtabula, Ashtabula co., Ohio, on Lake Erie, 55 mi. e. of Cleveland. Railroads: L. S. & M. S.; N. Y. C. & St. L.; and Pennsylvania. Industries: tool works, three flouring mills, two iron foundries, and fifteen factories. Natural gas in vicinity. Surrounding country, agricultural. Is a great receiving port for iron ore. The town was first settled in 1801 and became a city in 1892. Pop. est. 1897, 15,-000.

Ash-Wednesday, the first day of Lent, so called from a custom in the Western Church of sprinkling ashes that day on the heads of peniterts, then admitted to penance. The period at which the fast of Ash-Wednesday was instituted is uncertain.

Asia, the largest of the great divisions of the earth. Area est. at 17,296,000 sq. mi., about a third of all the land of the earth's surface. On three sides, n., e., and s., the ocean forms its natural boundary, while in the w. the frontier is marked mainly by the Ural Mountains, the Ural River, Caspian Sea, the Caucasus, the Black Sea, the Mediterranean, the Suez Canal, and the Red Sea. There is no proper separation between Asia and Europe, the later being really a great peninsula of the former. Asia, though not so irregular in shape as Europe, is broken in the s. by three great peninsulas, Arabia, Hindustan, and Farther India, while the e. coast presents peninsular projections and islands, forming a series of sheltered seas and bays, the principal peninsulas being Kamtchatka and Corea. The principal islands are those forming the Malay or Asiatic Archipelago, which stretch round in a wide curve on the s. e. of the continent. Besides the larger islands—Sumatra, Java, Borneo, Celebes, Mindanao, and Luzon (in the Philippine group)—there are countless smaller islands grouped round these. Other islands are Ceylon, in the s. of India; the Japanese islands and Sakhalin on the e. of the continent; Formosa, s. e. of China; Cyprus, s. of Asia Minor; and New Siberia and Wrangell Land, in the Arctic Ocean.

Political Divisions.—A large portion of Asia is under the dominion of European powers. Russia possesses the whole of Northern Asia (Siberia) and a considerable portion of Central Asia, together with a great part of ancient Armenia, on the s. of the Caucasus (pop. 16,-000,000); Turkey holds Asia Minor, Syria, and Palestine, part of Arabia, Mesopotamia, etc. (pop. 16,000,000); Great Britain rules over India, Ceylon, a part of the Indo-Chinese Peninsula (Upper and Lower Burmah) and several other possessions (pop. 290,000,000); France has acquired a considerable portion of the Indo-Chinese Peninsula, and has one or two other settlements (pop. 18,000,000); while to Holland belong Java, Sumatra, and other islands, or parts of islands, and to Spain the Phil-The chief independent states are the ippines. Chinese Empire (pop. 386,000,000), Japan (pop. 40,000,000), Siam (pop. 6,000,000). Afghanistan (pop. 5,000,000), Beluchistan, Persia (pop. 7,-000,000), and the Arabian states (pop. 3,000,-000). The most important of the religions of Asia are the Brahmanism of India, the creeds of Buddha, Confucius, and Lao-tse in China, and the various forms of Mohammedanism in Arabia, Persia, India, etc. Prob-ably more than half of the whole popula-tion profess some form of Buddhism. Several native Christian sects are found in India, Armenia, Kurdistan, and Syria.

Surface, Rivers, and Lakes.—The mountain systems of Asia are of great extent, and their culminating points are the highest in the world. The greatest of all is the Himalayan system, which lies mainly between lon. 70<sup>o</sup> and 100° e. and lat. 28° and 37° n. It extends, roughly speaking, from northwest to southeast, its total length being about 1,500 mi., forming the northern barrier of Hindustan. The loftiest summits are Mount Everest, 29,002 feet high, another peak 28,265, and Kinchinjinga, 28,156. The principal passes, which rise to the height of 18,000 to 20,000 feet, are the highest in the world. A second great mountain system of Central Asia, connected with the northwestern extremity of the Himalayan system by the elevated region of Pamir, is the Thian-Shan system, which runs northeastward for a distance of 1,200 mi. In this direction, the Altai, Sayan, and other ranges continue the line of elevations to the northeastern coast. A northwestern continuation of the Himalayas is the Hindu Kush, and farther westward a connection may be traced between the Hima-



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TYPES OF ASIATIC RACES. I. Jukagire from Kolima. 2. Ostjakin (Tinbak). 3. Mongolian, Karakalmuci (Utahur). 9. Chinese Woman, 10. Chinaman, 11. Singhalese (Ceylon). 12. Man of Kashmir. 13. Iranian, Persian Woman, 19. Wedda (Ceylon). 20. Woman and Child of Nigrito (Philippine Islands). 21. Japanese. 23. Japanese '



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4. Radishput (Radishputana). 5. Turk, Kirghis, 6. Tungusin, Tshapogirin. 7. Jakutin of Utshur. 8. Tibetanian 14. Malayana. 15. Malayans (Philippine Islands. 16. Tuda (Nilgiri, India). 17. Andamenian. 18. Andamenian Maan. 23. Man of Linkiu. 24. Corean. 25. Ainu (Jesso).







layan mass and the Elburz range (18,460 ft.), south of the Caspian, and thence to the mountains of Kurdistan, Armenia, and Asia Minor. There are vast plateaus and elevated valley regions connected with the great central mountain systems, but large portions of the conti-nent are low and flat. Thibet forms the most elevated table-land in Asia, its mean height being estimated at 15,000 feet. On its south is the Himalayan range, while the Kuen-Lun range forms its northern barrier. Another great but much lower plateau is that which comprises Afghanistan, Beluchistan, and Persia, and which to the northwest joins into the plateau of Asia Minor. The principal plain of Asia is that of Siberia, which extends along the north of the continent and forms an immense alluvial tract sloping to the Arctic Ocean. Vast swamps or peat-mosses called tundras cover large portions of this region. Southwest of Siberia, and stretching eastward from the Caspian, is a low-lying tract consisting, to a great extent, of steppes and deserts, and including in its area the Sca of Aral. In the east of China there is an alluvial plain of some 200,000 sq. mi. in extent; in Hindustan are plains extending for 2,000 mi. along the south slope of the Himalayas; and between Arabia and Persia, watered by the Tigris and Euphrates, is the plain of Mesopotamia or Assyria, one of the richest in the world. Of the deserts of Asia the largest is that of Gobi (lon. 90°-120° e., lat. 40°-48° n.), large portions of which are covered with nothing but sand or display a surface of bare rock. An almost continuous desert region may also be traced from the desert of North Africa through Arabia (which is largely occupied by bare deserts), Persia, and Beluchistan to the Indus.

Some of the largest rivers of Asia flow northward to the Arctic Ocean—the Obi, the Yenisei, and the Lena. The Hoang-Ho, and Yangtse, and the Amoor, are the chief of those which flow into the Pacific. The Ganges, Brahmaputra, Irawaddy, and Indus empty into the Indian Ocean. The Persian Gulf receives the united waters of the Euphrates and the Tigris. There are several systems of inland drainage, large rivers falling into lakes which have no outlet.

The largest lake of Asia (partly also European) is the Caspian Sea, which receives the Kur from the Caucasus (with its tributary the Aras from Armenia), and the Sefid Rud and other streams from Persia (besides the Volga from European Russia, and the Ural, which is partly European, partly Asiatic). The Caspian lies in the center of a great depression, being 83 feet below the level of the Sea of Azof. East from the Caspian is the Sea of Aral, which, like the Caspian, has no outlet, and is fed by the rivers Amoo Daria (Oxus) and Syr Daria. Still farther east, to the north of the Thian-Shan Mountains, and fed by the Ili and other streams, is Lake Balkash, also without an outlet and very salt. Other lakes having no communication with the ocean are Lob Nor, in the desert of Gobl, receiving the river Tarim, and the Dead Sea, far below the level of the Mediterranean,

and fed by the Jordan. The chief fresh-water lake is Lake Baikal, in the south of Siberia, between lon.  $104^{\circ}$  and  $110^{\circ}$  e., a mountain lake from which Yenisei draws a portion of its waters.

Geology.-Geologically speaking large areas of Asia are of comparatively recent date, the lowlands of Siberia, for instance, being submerged during the tertiary period, if not more recently. Many geologists believe that subsequently to the glacial period there was a great sea in Western Asia, of which the Caspian and Aral Seas are the remains. The desiccation of Central Asia is still going on, as is also probably the upheaval of a great part of the continent. The great mountain chains and elevated plateaus are of ancient origin, however, and in them granite and other crystalline Active volcarocks are largely represented. noes are only met with in the extreme east (Kamtchatka) and in the Eastern Archipelago. From the remotest times Asia has been celebrated for its mineral wealth. In the Altai and Ural Mountains gold, iron, lead, and platinum are found; in India and other parts rubies, diamonds, and other gems are, or have been, procured; salt in Central Asia; coal in China, India, Central Asia, etc.; petroleum in the districts about the Caspian and in Burmah: bitumen in Syria; while silver, copper, sulphur, etc., are found in various parts.

Climate.—Every variety of climate may be experienced in Asia, but as a whole it is marked by extremes of heat and cold and by great dryness, this in particular being the case with vast regions in the center of the  $\mathbf{The}$ continent and distant from the sea. great lowland region of Siberia has a short but very hot summer, and a long but intensely cold winter, the rivers and their estuaries being fast bound with ice, and at a certain depth the soil is hard frozen all the year round. The northern part of China to the east of Central Asia has a temperate climate with a warm summer, and in the extreme north a severe winter. The districts lying to the south of the central region, comprising the Indian and Indo-Chinese peninsulas, southern China, and the adjacent islands, present the characteristic climate and vegetation of the southern temperate and tropical regions modified by the effects of altitude. Some locali-ties in Southeastern Asia have the heaviest rainfall anywhere known. As the equator is approached the extremes of temperature diminish till at the southern extremity of the continent they are such as may be experienced in any tropical country. Among climatic features are the monsoons of the Indian Ocean and the eastern seas, and the cyclones or typhoons, which are often very destructive.

Vegetation.—The plants and animals of Northern and Western Asia generally resemble those of similar latitudes in Europe (which is really a prolongation of the Asiatic continent), differing more in species than in genera. The principal mountain trees are the pine, larch, and birch: the willow, alder, and poplar are found in lower grounds. In the central

region European species reach as far as the western and central Himalayas, but are rare in the eastern. They are here met by Chinese and Japanese forms. The lower slopes of the Himalayas are clothed almost exclusively with tropical forms. Higher up, between 4,000 and 10,000 feet, are found all the types of trees and plants that belong to the temperate zone, there being extensive forests of conifers. Here is the native home of the deodar cedar. The southeastern region, including India, the Eastern Peninsula, and China, with the is-lands, contains a vast variety of plants useful to man and having here their original habitat. such as the sugar-cane, rice, cotton, and indigo, pepper, cinnamon, cassia, clove, nutmeg, and cardamoms, banana, cocoa-nut, areca and sago palms; the mango and many other fruits, with plants producing a vast number of drugs, caoutchouc and gutta-percha. The forests of India and the Malay Peninsula contain oak, teak, sál, and other timber woods, besides bam-boos, palms, sandal-wood, etc. The palmyra palm is characteristic of southern India; while the talipot palm flourishes on the western coast of Hindustan, Ceylon, and the Malay Peninsula. The cultivated plants of India and China include wheat, barley, rice, maize, millet, sorghum, tea, coffee, indigo, cotton, jute, opium, tobacco, etc. In north China and the Japanese islands large numbers of deciduous trees occur, such as oaks, maples, limes, walnuts, poplars, and willows, the genera being European, but the individual species Asiatic. Among cultivated plants are wheat, and in favorable situations, rice, cotton, the vine, etc. Coffee, rice, maize, etc., are extensively grown in some of the islands of the Asiatic Archipelago. In Arabia and the warmer valleys of Persia, Afghanistan, and Beluchistan, aromatic shrubs are abundant. Over large parts of these regions the date-palm flourishes and affords a valuable article of food. Gum-producing acacias are, with the date-palm, the commonest trees in Arabia. African forms are found extending from the Sahara along the desert region of Asia.

Zoology.—Nearly all the mammals of Europe occur in Northern Asia, with numerous additions to the species. Central Asia is the native land of the horse, the ass, the ox, the sheep, and the goat. Both varieties of the camel, the single and the double humped, are Asiatic. To the inhabitants of Thibet and the higher plateaus of the Himalayas the yak is what the reindeer is to the tribes of the Siberian plain, almost their sole wealth and support. The elephant, of a different species from that of Africa, is a native of tropical Asia. The Asiatic lion, which inhabits Arabia, Persia, Asia Minor, Beluchistan, and some parts of India, is smaller than the African species. Bears are found in all parts, the white bear in the far north, and tropical parts. The tiger is the most characteristic of the larger Asiatic carnivora. It extends from Armenia across the entire continent, being absent, however, from

the greater portion of Siberia and from the high table-land of Tibet; it extends also into Sumatra, Java, and Bali. In Southeastern Asia and the islands we find the rhinoceros, buffalo, ox, deer, squirrels, porcupines, etc. In birds nearly every order is represented. Among the most interesting forms are the hornbills, the peacock, the Impey pheasant, the tragopan or horned pheasant, and other gallinaceous birds, the pheasant family being very characteristic of Southeastern Asia. It was from Asia that the common domestic fowl was introduced into Europe. The tropical parts of Asia abound in monkeys, of which the species are numerous. Some are tailed, others, such as the orang, are tailless, but none have prehensile tails like the American monkeys. In the Malay Archipelago marsupial animals, so characteristic of Australia, first occur in the Moluccas, and Celebes, while various mammals common in the western part of the Archipelago are absent. A similar transition toward the Australian type takes place in the species of Of marine mammals the dugong is birds. peculiar to the Indian Ocean; in the Ganges is found a peculiar species of dolphin. At the head of the reptiles stands the Gangetic crocodile, frequenting the Ganges and other large da capello, one of the most deadly snakes in existence; there are also large boas and pythons, besides sea and freshwater snakes. The seas and rivers produce a great variety of fish. The Salmonidæ are found in the rivers flowing into the Arctic Ocean. Two rather remarkable fishes are the climbing perch and the archer-fish. The well-known goldfish is a native of China.

Population. — Asia is mainly peopled by races belonging to two great ethnographic types, the Caucasic or fair type, and the Mongolic or yellow. To the former belong the Aryan or Indo-European, and the Semitic races, both of which mainly inhabit the southwest of the continent; to the latter belong the Malays and Indo-Chinese in the southeast, as well as the Mongolians proper (Chinese, etc.), occupying nearly all the rest of the continent. To these may be added certain races of doubtful affinities, as the Dravidians of southern India, the Cingalese of Ceylon, the Ainos of Yesso, and some negro-like tribes called Negritos, which inhabit Malacça and the interior of several of the islands of the Eastern Archipelago. The total population is estimated at about 800,000,000, or more than half that of the whole world.

History.—Asia is generally regarded as the cradle of the human race. It possesses the oldest historical documents, and next to the immediately contiguous kingdom of Egypt, the oldest historical monuments in the world. The Old Testament contains the oldest historical records which we have of any nation in the form of distinct narrative. The period at which Moses wrote was probably 1,500 or 1,600 years before the Christian era. His and the later Jewish writings confine themselves almost ex-





clusively to the history of the Hebrews; but in Babylonia, as in Egypt, civilization had made great advances long before this time. The earliest seat of the Aryan race was probably on the banks of the Oxus. Hence, perhaps from the pressure of the Mongolian tribes to the north, they spread themselves to the southeast and southwest, finally occupying northern In-dia, Persia, and other parts of Western Asia, and spreading into Europe, perhaps about 2000-1500 B. c. In China authentic history extends back probably to about 1000 B. C., with a long preceding period of which the names of dynasties are preserved without chronological arrangement, The kingdoms of Assyria, Babylonia, Media, and Persia, alternately predominated in Southwestern Asia. In regard to the history of these monarchies much light has been obtained from the decipherment of the cuneiform inscriptions. The arms of the Pharaohs extended into Asia, but their conquests there were short-lived. From Cyrus (B. c. 559), who extended the empire of Persia from the Indus to the Mediterranean, while his son. Cambyses, added Egypt and Lybya to it, to the conquest of Alexander (B. c. 330), Persia was the dominant power in Western Asia. Alexander's great empire became broken up into separate kingdoms, which were finally absorbed in the Roman Empire, and this ulti-mately extended to the Tigris. Soon after the most civilized portions of the three continents had been reduced under one empire, the great event took place which forms the dividing line of history-the birth of Christ and the spread of Christianity. In A. D. 226 a protracted struggle began between the newer Persian Empire and the Romans, which lasted till the advent of Mohammed and the conquests of the Arabians. Persia was the first great conquest of Moham med's followers. Syria and Egypt soon fell before their arms, and within forty years of the celebrated flight of Mohammed from Mecca (the *Hejira*), the sixth of the caliphs, or successors of the Prophet, was the most power-ful sovereign of Asia. The Mongols next be-came the dominant race. In 999 Mahmud, whose father, born a Turkish slave, became governor of Ghazni, conquered India, and es-lablished his rule. The dynasty of the Seljuk Tatars was established in Aleppo, Damascus, Iconium, and Kharism, and was distinguished for its struggles with the Crusaders. Othman, an emir of the Seljuk sultau of Iconium, established the Ottoman Empire in 1300. About 1220 Genghis Khan, an independent Mongol chief, made himself master of Central Asia. conquered Northern China, overran Turkestan, Afghanistan, and Persia; his successors took Bagdad and extinguished the caliphate. In Asia Minor they overthrew the Seljuk dynasty. One of them, Timur or Tamerlane, carried fire and sword over Northern India and Western Asia, defeated and took prisoner Bajazet, the descendant of Othman (1402), and received tribute from the Greek emperor. The Ottoman Empire soon recovered from the blow inflicted by Timur, and Constantinople was taken and the Eastern Empire finally overthrown by

the Sultan Mohammed II in 1453. China recovered its independence about 1368 and was again subjected by the Manchu Tatars (1618-45), soon after which it began to extend its empire over Central Asia. Siberia was conquered by the Cossacks on behalf of Russia (1580-84). The same country effected a settlement in the Caucasus about 1786, and has since continued to make steady advances into Central Asia. The discovery by the Portuguese of the passage to India by the Cape of Good Hope led to their establishment on the coast of the peninsula (1498). They were speedily followed by the Spanish Dutch. French, and British. The Spanish, Dutch, French, and British. The struggle between the two last powers for the supremacy of India was completed by the destruction of the French settlements (1760-65). France has recently acquired an extensive territory in Farther India. At present the forms of government in Asia range from the primitive rule of the nomad sheik to the despotism of China. India has been brought by Britain directly under European influence, and Japan is freely modeling her institutions on those of the West.

Asia, Central, a designation loosely given to the regions in the center of Asia east of the Caspian, also called Turkestan, and formerly Tartary. The eastern portion belongs to China. the western now to Russia. Russian Central Asia comprises the Kirghiz Steppe (Uralsk, Turgai, Akmolinsk, Semipalatinsk, etc.), and what is now the government-general of Turkestan, besides the territory of the Turkomans, or Transcaspia and Merv. Russia has thus absorbed the old khanate of Khokand and part of Bokhara and Khiva, and controls the vassal territories of Bokhara and Khiva, the southern boundary being the Persian and Afghan frontiers.

Asia Minor, the most westerly portion of Asia, being the peninsula lying w. of the Upper Euphrates, and forming part of Asiatic Turkey. It forms an extensive plateau, with lofty mountains rising above it, the most extensive ranges being the Taurus and Anti-Taurus, which border it on the s. and s.e., and rise to over 10,000 ft. There are numer-ous salt and fresh-water lakes. The chief rivers are the Kizil-Irmak (Halys), Sakaria (Sangarius), entering the Black Sea; and the Sarabat (Hermus) and Menderes (Mæander). entering the Ægean. The coast regions are generally fertile, and have a genial climate: the interior is largely arid and dreary. Valuable forests and fruit-trees abound. Smyrna is the chief town; Anatolia is an equivalent name

Askabad', the administrative center of the Russian province of Transcaspia, situated in the Akhal Tekke oasis, and occupied by Skobeleff in January, 1881, after the sack of Geok Tepé. Its distance from Merv is 232 mi., from Herat 388 mi.

As'kew, ANNE (1521-1546), a victim of religious persecution. She was a daughter of Sir William Askew of Lincolnshire, and was married to a wealthy neighbor named Kyme, who, irritated by her Protestantism, drove her from

#### Asmannshausen

his house. In London she spoke against the dogmas of the old faith, and was condemned to death as a heretic.

As' mannshausen (-hou-zn), a Prussian village on the Rhine, in the district of Wiesbaden, celebrated for its wine. Many prefer the red wine of Asmannshausen to the best Burgundy, but it retains its merits for three or four years only.

**Asnières** (än-yär), a town on the Seine, of from 6,000 to 7,000 inhabitants, a favorite boating resort with the Parisians.

Asp (Aspic), a species of viper found in Egypt, resembling the cobra de capello or spectacle-serpent of the East Indies, and having a very venomous bite. When approached or disturbed it elevates its head and body, swells out its neck, and appears to stand erect to attack the aggressor. Hence the ancient Egyptians believed that the asps were guardians of the spots they inhabited, and the figure of this reptile was adopted as an emblem of the protecting genius of the world. The balancing motions made by it in the endeavor to maintain the erect attitude have led to the employment of the asp as a dancing serpent by the African jugglers. Cleopatra is said to have committed suicide by means of an asp's bite. The name asp is also given to a viper common on the continent of Europe.

Aspar'agus, a plant, the young shoots of which, cut as they are emerging from the ground, are a favorite culinary vegetable. In Greece, and especially in the southern *steppes* of Russia and Poland, it is found in profusion; and its edible qualities were esteemed by the ancients. It is mostly boiled and served with-



Asparagus. a-Upper end of stem, showing leaves. b-Young shoot.

out admixture, and eaten with butter and salt. The plants should remain three years in the ground before they are cut; after which, for ten or twelve years, they will continue to afford a regular annual supply. The beds are protected by straw or litter in winter.

## Asphalt

Aspa'sia, a celebrated lady of ancient Greece, b. at Miletus, in Ionia, but passed a great part of her life at Athens, where her house was the general resort of the most distinguished men in Greece. She won the affection of Pericles, who united himself to Aspasia as closely as was permitted by the Athenian law, which declared marriage with a foreign woman illegal. She had a son by Pericles, who was legitimated (B. c. 430) by a special decree of the people.

As' pen, or trembling poplar, a species of poplar indigenous to Britain and to most mountainous regions throughout Europe and Asia. It is a beautiful tree of rapid growth and extremely hardy, with nearly circular-toothed



Branch of Aspen. a-Catkin.

leaves, smooth on both sides, and attached to footstalks so long and slender as to be shaken by the slightest wind; wood, light, porous, soft, and of a white color, useful for various purposes.

Aspen, Pitkin co., Colo., situated on Castle Creek at an elevation of 7,700 ft. above the sea level, 60 mi. w. by s. of Leadville. It is in the center of a rich lead and silver mining country. Railroads: D. & R. G., and Colo. Midland. Pop. est. 1897, 9,500.

As'pern and Esslingen (es'ling-en), two villages east of Vienna, and on the opposite bank of the Danube; celebrated as the chief contested positions in the bloody but undecisive battle fought between the Archduke Charles and Napoleon I, May 21 and 22, 1809, when it was estimated that the Austrians lost a third of their army, and the French no less than half.

Asphalt, Asphal'tum, the most common variety of bitumen: also called mineral pitch. Asphalt is a compact, glossy, brittle, black or brown mineral, which breaks with a polished fracture, melts easily with a strong, pitchy odor when heated, and when pure burns without leaving any ashes. It is found in the earth in many parts of Asia, Europe, and America, and in a soft or liquid state on the surface of the Dead Sea, which from this circumstance was called Asphaltites. It is of organic origin, the asphalt of the great Pitch Lake of Trinidad being derived from bituminous shales, containing vegetable remains in the process of transformation. Asphalt is produced artificially in making coal gas. Dur-

ing the process much tarry matter is evolved and collected in retorts. If this be distilled, naphtha and other volatile matters escape, and asphalt is left behind. The asphaltum is dug out of the lake with mattocks and picks, molded into buckets, and taken directly to the vessel for shipmen. Crude asphaltum cannot be used in paving streets but must be put through a refining process which consists principally of a slow application of heat and precipitation. It takes three tons of the crude material to make two tons of refined asphalt. The first step in the refining process is to place the asphaltum in great tanks and melt it down. It is necessary that the material be stirred continually during this process. A certain proportion of the residuum of petroleum is put into the asphaltum to act as a flux and melt the substance at a lower temperature than it otherwise would melt; thus all of the oils in the asphaltum are saved. This mixture when done is called the "paving cement." While this process is going on, sharp, clean sand is being heated to about 300 degrees in large revolving drums. This sand is mixed in a certain proportion with the above mixture, to both of which is then added a certain proportion of carbonate of lime. The three substances are then mixed by means of a number of iron arms revolving at a very high speed. The whole mixture, known as a "street mixture," is then taken to the street to be laid as pavement.

Before the street is ready for the asphalt there must be done a certain amount of preliminary work. The street must be carefully graded to within eight or nine inches of the proposed finished surface. It is necessary that the sub-grade be very solid and rolled with a steam roller. Upon this foundation is laid a six-inch bed of hydraulic cement concrete, made of cement, clean, sharp sand, and broken stone. This, too, must be well rammed broken stone. This, too, must be well rammed and rolled. Upon the efficiency of this preliminary work depends the value of the pave-ment when completed. The asphalt is usually laid on in two courses; the first, a cushion coat and then a surface coat. The asphalt "street mixture" is applied when it is at a temperature of about 250 or 300 degrees. The cushion coat is usually from one-half to one inch thick, and the surface coat is thick enough to make the entire sheet of asphalt two and one-half inches thick. The hot mixture is dumped into the street and spread evenly from curb to curb with hot rakes. Iron tampers and smoothers, also heated, smooth and finish the surface, which is then rolled with a handroller, then a five-ton, and last with a ten-ton roller. The street mixture contains from 13 to 20 per cent. of asphaltic cement, from 82 to 65 per cent. of clean, selected sand, and from 5 to 15 per cent. of pulverized carbonate of lime. The surface coat is sprinkled with a small amount of hydraulic cement before the heavy rollers are passed over it.

Asphalte (or Asphalt) Rock, a limestone Impregnated with bitumen, found\_ in large quantities in various localities in Europe, as

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in the Val de Travers, Neuchâtel, Switzerland; in the department of Ain in France; in Alsace, Hanover, Holstein, Sicily, etc. These rocks contain a variable quantity of bitumen (from 7 or 8 to 20 or 30 per cent.) naturally dif-fused through them. The Val de Travers asphalt was discovered in 1710. Since then other asphalte-rocks, as well as artificial preparations made by mixing bitumen, gas-tar, pitch, or other materials, with sand, chalk, etc., have been brought into competition with it. From 1880 to 1890, inclusive, there were 6,803,054 sq. yds. of Trinidad asphalt paving laid in the U.S.

Asphodel, a genus of plants, consisting of perennials, with fasciculated fleshy roots, flowers arranged in racemes, six stamens inserted at the base of the perianth, a sessile almost spherical ovary with two cells, each containing two ovules; fruit a capsule with three cells, in each of which there are, as a rule, two seeds. They are fine garden plants, native of Southern Europe. The king's spear has yellow flowers, blossoming in June. Another species, which attains a height of 5 ft., is cultivated in Algeria and elsewhere, its tubercles yielding a very pure alcohol, and the residue, together with the stalks and leaves,

being used in making pasteboard and paper. Asphyx'ia, literally, the state of a living animal in which no pulsation can be perceived, but the term is more particularly applied to a suspension of the vital functions from causes hindering respiration. The normal accompaniments of death from asphyxia are dark fluid blood, a congested brain and exceedingly congested lungs, the general engorgement of the viscera, and an absence of blood from the left cavities of the heart while the right cavities and pulmonary artery are gorged. The restoration of asphyxiated persons has been successfully accomplished at long periods after apparent death. The attempt should be made to maintain the heat of the body and to secure the inflation of the lungs as in the case of the apparently drowned.

As' pinwall. See Colon.

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As' pirator, an instrument used to promote the flow of a gas from one vessel into another by means of a liquid. The simplest form of aspirator is a cylindrical vessel containing water, with a pipe at the upper end which communicates with the vessel containing the gas, and a pipe at the lower end also, with a stop-cock and with its extremity bent up. By allowing a portion of the water to run off by the pipe at the lower part of the aspirator, a measured quantity of air or other gas is sucked into the upper part.

Aspromon'te, a mountain of Italy in the s.w. of Calabria, where Garibaldi was wounded and taken prisoner with the greater part of his army, in August, 1862. As'rael, the Mohammedan angel of death,

who takes the soul from the body.

Ass, a species of the horse genus, supposed by Darwin to have sprung from the wild variety found in Abyssinia; by some writers to be a descendant of the *onager*, or wild ass, inhabiting the mountainous deserts of Tartary,



## Assam

etc.; and by others to have descended from the kiang or djiggetai of s.w. Asia. Both in color and size the ass is exceedingly variable, ranging from dark gray and reddish brown to white, and from the size of a Newfoundland dog in North India to that of a good-sized horse. In the s.w. countries of Asia and in Egypt, in some districts of Southern Europe, as in Spain, and in Kentucky and Peru, great attention has been paid to selection and interbreeding, with a result no less remarkable



#### The Ass.

than in the case of the horse. Thus in Syria there appear to be four distinct breeds: a light and graceful animal used by ladies, an Arab breed reserved for the saddle, an ass of heavier build in use for plowing and draft purposes, and the large Damascus breed. The male ass is mature at two years of age, the female still earlier. The teeth of the young ass follow the same order of appearance and renewal as those of the horse. The life of the ass does not usually exceed thirty years. It is in general much healthier than the horse, and is maintained in this condition by a smaller quantity and coarser quality of food; it is superior to the horse in its ability to carry heavy burdens over the most precipitous roads, and is in no respect its inferior in intelligence. The skin is used as parchment to cover drums, etc., and in the East is made into shagreen. The hybrid offspring of the horse and the female ass is the hinny, that of the ass and the mare is the mule; but the latter is by far the larger and more useful animal. Asses' milk, long celebrated for its sanative qualities, more closely resembles that of a woman than any other. It is very similar in taste, and throws up an equally fluid cream, which is not convertible into butter.

Assam', a chief province of British India; area 49,004 sq. mi. The climate is marked by great humidity, and malarious diseases are common in the low grounds; otherwise it is not unhealthy. The whole province, except

## Assaying

the cultivated area, may be designated as forest, the trees including teak, sal, sissoo, the date and sago palm, the areca palm (the betelnut tree), the Indian fig-tree, etc. The article of most commercial importance is tea, the yield of which is now over 60,000,000 lbs. annually. Other crops raised are rice, Indian corn, pulse, oil-seeds, sugar-cane, hemp, jute, potatoes, etc. In the jungles and forests roam herds of elephants, the rhinoceros, tiger, buffalo, leopard, bear, wild hog, jackal, fox, goat. and various kinds of deer. Among serpents are the python and the cobra. Pheasants, partridges, snipe, wild peacock, and many kinds of water-fowl abound. Coal, petroleum, and limestone are found in abundance, iron is smelted to a small extent, gold-dust is met with, lime is exported to Bengal. Pop. 4,881,-426, about 3,062,000 of whom are Hindus, 1.317,000 Mohammedans, 7,000 Christians. In 1826 Assam became a possession of Britain. The largest town is Sylhet (pop. 14,000).

Assass'ins, an Asiatic order or society having the practise of assassination as its most distinctive feature, founded by Hassan Ben Sabbah, a dai or missionary of the heterodox Mohammedan sect, the Ismaelites. The society grew rapidly in numbers, and in 1090 the Persian fortress of Alamut fell into their hands. Other territories were added, and the order became a recognized military power. Upon a select band fell the work of assassination, to which they were stimulated by the intoxicating influences of hashish. From the epithet hashishim (hemp-caters) which was applied to the order, the European word assassin has been derived. Hassan, after a long and prosperous reign, died in 1124. Most of his successors died violent deaths at the hands of relatives or dependents. After withstanding the sultans Noureddin and Saladin, and making themselves feared by the Crusaders, the Assassins were overcome by the Tatar leader, Hulaku. The last chief, Rokneddin, was killed for an act of treachery subsequent to his capture, and his death was followed by a general massacre of the assassins, in which 12,000 perished. Dispersed bands led a roving life in the Syrian mountains, and it is alleged that in the Druses and other small existing tribes their descendants are still to be found.

**Assaye** (Assye) (as-si'), a village in Southern India, in Hyderabad, where Wellington gained a famous victory in 1803. The victory, however, cost him more than a third of his men.

Assaying, the estimation of the amount of pure metal, and especially of the precious metals, in an ore or alloy. In the case of silver the assay is either by the dry or by the wet process. The dry process is called *cupellation* from the use of a small and very porous cup, called a *cupel*, formed of well-burned and finely ground bone-ash made into a paste with water. The cupel, being thoroughly dried, is placed in a fire-clay oven about the size of **a** drain-tile, with a flat sole and arched roof, and with slits at the sides to admit air. This oven, called a *muffle*, is set in a furnace, and when it is at a red heat the assay, consisting of a smali

weighed portion of the alloy wrapped in sheet-lead, is laid upon the cupel. The heat causes the lead to volatilize or combine with the other metals, and to sink with them into the cupel, leaving a bright globule of pure metallic silver, which gives the amount of silver in the alloy operated on. In the wet process the alloy is dissolved in nitric acid, and to the solution are added measured quantities of a solution of common salt of known strength, which precipitates chloride of silver. The which precipitates chloride of silver. operation is concluded when no further precipitate is obtained on the addition of the salt solution, and the quantity of silver is calculated from the amount of salt solution used. An alloy of gold is first cupeled with lead as above, with the addition of three parts of silver for every one of gold. After the cupellation is finished, the alloy of gold and silver is beat en and rolled out into a thin plate, which is curled up by the fingers into a little spiral or cornet. This is put into a flask with nitric acid, which dissolves away the silver and leaves the cornet dark and brittle. After washing with water the cornet is boiled with stronger nitric acid to remove the last traces of silver, well washed, and then allowed to drop into a small crucible, in which it is heated, and then it is weighed. The assay of gold, therefore, consists of two parts: cupellation, by which inferior metals (except silver) are removed; and quartation, by which the added silver and any silver originally present are got rid of. The quantity of silver added has to be regulated to about three times that of the gold. If it be more the cornet breaks up, if it be less the gold protects small quantities of the silver from the action of the acid. Where, as in some gold-manufactured articles, these methods of assay cannot be applied, a streak is drawn with the article upon a touchstone, consisting of coarse-grained Lydian quartz saturated with bituminous matter, or of black ba-salt. The practised assayer will detect approximately the richness of the gold from the color of the streak, which may be further subjected to an acid test.

Assignats (ås-ë-nyà), the name of the na-tional paper currency in the time of the French Revolution. Assignats to the value of \$80,000,000 were first struck off by the Constituent Assembly, with the approbation of the king, April 19, 1790, to be redeemed with the proceeds of the sale of the confiscated goods of the church. August 27 of the same year, Mirabeau urged the issuing of \$400,000,-000 of new assignats, which caused a dispute in the assembly. Vergasse and Dupont, who saw that the plan was an invention of Clavière for his own enrichment, particularly distinguished themselves as the opponents of the Mirabeau's exertions, however, were scheme. seconded by Péthion, and \$160,000,000 more were issued. They were increased by degrees to \$9,115,600,000, and their value rapidly declined. In the winter of 1702-93 they lost 30 per cent., and in spite of the law to compel their acceptance at their nominal value they continued to fall till in the spring of 1796

they had sunk to one three-hundred-and-fortyfourth their nominal value. This depreciation was due partly to the want of confidence in the stability of the government, partly to the fact that the coarsely executed and easily counterfeited assignats were forged in great numbers. They were withdrawn by the Directory from the currency, and at length redeemed by mandats at one thirtieth of their nominal value.

Assinibol'a, the smallest of the four districts into which a portion of the northwestern territories of Canada was divided in 1882. Some coal is mined. Area 89,535 sq. mi.; pop. 1891, 30,374. Capital, Regina, on the Canadian Pacific railway, which intersects the district.

Assiniboine, a river of Canada, which flows through Manitoba and joins the Red River at Winnipeg, about 40 mi. above the entrance of the latter into Lake Winnipeg, after a somewhat circuitous course of about 500 mi. from the west and northwest. Steamers ply on it for over 300 mi.

Assisi (às-sē'sē), a small town in Italy, in the province of Umbria, 20 mi. n. of Spoleto, the see of a bishop, and famous as the birthplace of St. Francis d'Assisi. The splendid church built over the chapel where the saint received his first impulse to devotion, is one of the finest remains of mediæval Gothic architecture.

Association of ideas, the term used in psychology to comprise the conditions under which one idea is able to recall another to consciousness. Recently some psychologists have been disposed to classify these conditions under two general heads; the law of contiguity, and the law of association. The first states the fact that actions, sensations, emotions, and ideas, which have occurred together, or in close succession, tend to suggest each other when any one of them is afterward presented to the mind. The second indicates that present actions, sensations, emotions, or ideas tend to recall their like from among previous experiences. Other laws have at times been enunciated, but they are reducible to these; thus, the "law of contrast or contrariety" is properly a case of contiguity. On their physical side the principles of association correspond with the physiological facts of re-excitation of the same nervous centres, and in this respect they have played an important part in the endeavor to place psychology upon a basis of positive science. The laws of association, taken in connection with the law of relativity, are held by many to be a complete exposition of the phenomena of intellect.

**Assouan** (às-sö-án') (or Essouan), a town of Upper Egypt, on the east bank of the Nile, below the first cataract. The granite quarries of the Pharaohs, from which were procured the stones for the great obelisks and colossal statues of ancient times, are in the neighborhood. Pop. about 6,000; trade in dates, senna, etc.

Assump'sit, in common law, an action to recover compensation for the non-performance of a *parole* promise; that is, a promise not contained in a deed under seal. Assumpsits are of two kinds, *express* and *implied*. The former are where the contracts are actually made in word or writing; the latter are such as the law implies from the justice of the case; e.g., employment to do work implies a promise to pay.

**Assyr'ia** (the Asshur of the Hebrews, Athurd of the ancient Persians), an ancient monarchy in Asia. Area about 100,000 sq. mi.; surface partly mountainous, hilly, or undulating, partly a portion of the fertile Mesopotamian plain. The numerous remains of ancient habitations show how thickly this vast flat must have once been peopled; now, for the most part, it is a mere wilderness. The chief cities of Assyria in the days of its prosperity were Nineveh, the site of which is marked by mounds opposite Mosul (Nebi Yunus and Koyunjik), Calah or Kalah Sherghat), Sargina (Khorsabad), and Arbela (Arbil).

Much light has been thrown on the history of Assyria by the decipherment of the cuneiform inscriptions obtained by excavation. The assertion of the Bible that the early inhabitants of Assyria went from Babylon is in. conformity with the traditions of later times, and with inscriptions on the disinterred Assyrian monuments. For a long period the country was subject to governors appointed by the kings of Babylon, but about B. c. 1500 it became independent. About the end of the fourteenth century its king, Shalmaneser, is said to have founded the city of Kalakh (or Calah); his son, Tiglath-ninip, conquered the whole of the valley of the Euphrates. The five following reigns were chiefly occupied by wars with the Babylonians. About 1120 Tiglath-Pileser I, one of the greatest of the sovereigns of the first Assyrian monarchy, ascended the throne, and carried his conquests to the Mediterranean on the one side and to the Caspian and the Persian Gulf on the other. At his death there ensued a period of decline, which lasted over 200 years. Under Assur-nazir-pal, who reigned from 884 to 859 B. c., Assyria once more advanced to the position of the leading power in the world, the extent of his kingdom being greater than that of Tig-lath-Pileser. The magnificent palaces, temples, and other buildings of his reign prove the advance of the nation in wealth, art, and luxury. In 859 he was succeeded by his son Shalmaneser II, whose career of conquest was equally successful. He reduced Babylon to a state of vassalage, and came into hostile contact with Benhadad and Hazael of Damascus, and with Ahab and Jehu of Israel, from whom he exacted tribute, as also from the kings of Tyre and Sidon. The old dynasty came to an end in the person of Assurnirari II, who was driven from the throne by a usurper, Tiglath-Pileser, in 745, after a struggle of some years. No sooner was this able ruler firmly seated on the throne than he made an expedition into Babylonia, followed by another to the east in 744. A year later he de-feated the confederate princes of Armenia, Syria, etc., and advancing against Syria, over-

threw the ancient kingdoms of Damascus and Hamath, and placed his vassal Hosea on the throne of Samaria. A protracted campaign in Media (737-735), another in Armenia, and the expedition into Syria mentioned in 2 Kings 16, are among the most important events of the latter years of his reign. Tiglath-Pileser carried the Assyrian arms from Lake Van on the north to the Persian Gulf on the south, and from the confines of India on the east to the Nile on the west. He was, however, driven from his throne by Shalmaneser IV (727), who blockaded Tyre for five years, invaded Israel, and besieged Samaria, but died before the city was reduced. His successor, Sargon (722-705), a usurper, claimed descent from the ancient Assyrian kings. After taking Samaria, he overthrew the combined forces of Elam (Susiana) and Babylon. The revolted Armenians had also more than once to be put In 710 Merodach-Baladan was driven down. out of Babylonia by Sargon, after holding it for twelve years as an independent king, and being supported by the rulers of Egypt and Palestine; his allies were also crushed, Judah was overrun, and Ashdod leveled to the ground. Sargon latterly crossed over and took Cyprus. He was murdered, being succeeded by Sennacherib, one of his younger sons, in 705. Sennacherib at once had to take up arms against Merodach Baladan, who had again obtained possession of Babylon. He defeated Hezekiah and his Egyptian and Ethiopian allies, and forced him to pay tribute, after which he returned to Assyria to overawe the Babylonians, Elamites, and the northern hill tribes. In 681 he was murdered by his two sons, Adrammelech and Sharezer, but they were defeated by their brother, Esarhaddon, who then mounted the throne, fixed his residence at Babylon, and made it his capital. Egypt was reduced to a state of vassalage, the Ethiopian ruler, Tirhakah, being driven out and the land divided into twenty separate kingdoms. In 652 a general insurrection broke out, headed by Sammughes, governor of Babylonia, and including Babylonia, Egypt, Palestine, and Arabia. Egypt was the only power, however, which regained its independence. Though the king's character was marked by cruelty and sensuality, he was a zealous patron of the arts and learning. He died in 625, and was succeeded by his son, Assur-emid-ilin (or Sarakos), under whom Babylon definitely threw off the Assyrian yoke. The capital, Nineveh, was captured and burned by the allied forces of the Medes and Babylonians, about 607 or 606 B.c. Assyria now fell partly to Media, partly to Babylonia, and afterward formed with Babylonia one of the satrapies of the Persian Empire. In 312 B.c. it became part of the kingdom of the Seleucidæ; later on it came under Parthian rule, and was more than once a Roman possession. For a long period it was under the caliphs of Bagdad. In 1638 the Turks wrested it from the Persians, and it has continued under their dominion since that date.

The original inhabitants of Assyria and

## Assyria

Babylonia are known as Accadians (or Sumerians). They belonged to the Turanian or Ural-Altaic race, and were, therefore, of the same stock as that from which the Finns, Turks, and Magyars have descended. In early times a Semitic race of people spread themselves over the country, and mingled with or supplanted the original inhabitants, while their language took the place of the Accadian, the latter becoming a dead language. These later Assyrians were thus akin to the Hebrews, Phœnicians, and modern Arabians. Their language differed little from the Babylonian, and both retained traces of the influence of the earlier Accadian. Assyrian is closely allied to Hebrew and Phœnician, and changed little throughout the 1,500 years during which we can trace it in the inscriptions. It continued to be written with the cuneiform or arrowheaded character down to the third century B. C. The greater part of the Assyrian literature was stamped in minute characters on baked bricks, the subjects comprising hymns to the gods, mythological and epic poems, and works on history, chronology, astrology, law, etc. After Assur, the chief god, came twelve chief deities, including Anu, the father of the gods: Bel, the lord of the world: Hea, the lord of the sea; Sin, the moon-god; Shamas, the sun-god; Istar, a powerful goddess with various attributes; Ninip, god of hunting (the man-bull); Nergal, god of war (the man-



The God Nergal (British Museum).

lion): etc. A number of spirits, good and evil, presided over the minor operations of nature. There were set forms regulating the worship of all the gods and spirits, and prayers to each were inscribed on clay tablets with blanks for the names of the persons using them.

The Assyrians were far advanced in art and industry, and in civilization in general. They constructed large buildings, especially palaces of brick, burned or sun-dried, stone, alabaster slabs for lining and adorning the walls internally and externally, and timber for pillars and roofs. These alabaster slabs were elaborately sculptured with designs serving to throw much light on the manners and customs of the people. The palaces were raised on high terraces, and often comprised a great number of apartments; there were no windows, light being obtained by carrying the walls up to a

#### Assyriology

certain height and then raising on them pillars to support the roof and admit light and air. The Assyrian sculptures, as a rule, were in relief, figures in the full round being the exception. More than three quarters of the reliefs are of warlike scenes; hunting scenes are also favorite subjects. The vestiges of Assyrian painting consist chiefly of fragments of stucco and glazed tiles. In these, traces of Egyptian influence are to be found, but the Assyrian figure type is for the most part of a more voluptuous and vigorous fullness than the Egyptian. They understood and applied the arch; constructed tunnels, aqueducts, and drains; used the pulley, the lever, and the roller; engraved gems in a highly artistic way; understood the arts of inlaying, enameling, and overlaying with metals: manufactured porcelain, transparent and colored glass; were acquainted with the lens; and possessed vases, jars and other dishes, bronze and ivory ornaments, bells, gold earrings and bracelets of excellent design and workmanship. Their household furniture also gives a high idea of their skill and taste. The cities of Nineveh, Assur, and Arbela had each their royal observatories, superintended by astronomers-royal, who had to send in their reports to the king twice a month. At an early date the stars were numbered and named; a calendar was formed, in which the year was divided into twelve months (of thirty days each), called after the zodiacal signs; but as this division was found to be inaccurate an intercalary month was added every six years. The week was divided into seven days, the seventh being a day of rest; the day was divided into twelve periods of two hours each, each of these being subdivided into sixty minutes, and these again into sixty seconds. Eclipses were recorded from a very remote epoch, and their recurrence roughly determined. The principal astronomical work, called the *Illumination of Bel*, was inscribed on seventy tablets, and went through numerous editions, one of the latest being in the British Museum. It treats among other things of comets, the polar star, the conjunction of the sun and moon, and the motions of Venus and Mars.

Assyriology, the department of knowledge which deals with Assyrian antiquities and history, is entirely a modern study. Until 1842 the materials for Assyrian history were derived from the Jewish records of the Old Testament and from such comparatively late writers as Herodotus and Ctesias. In 1843-46 M. Botta, the French consul at Mosul, made the first explorations at Koyunjik and Khorsabad, and the objects thus obtained were transported to the Louvre. In 1845 and in 1849 valuable researches were conducted by Mr. Layard, and subsequently continued by the British Museum trustees. Later researches were instituted by the proprietors of the Daily Telegraph, and then by the government, in which Mr. George Smith met with considerable success. More recently Mr. Rassam has carried on the work of discovery. In the decipherment and translation of the cuneiform inscriptions among the most distinguished names are those of Sir Henry Rawlinson, Mr. H. Fox Talbot, Mr. George Smith, M. Jules Oppert, Dr. Schrader, Dr. Hincks, Rev. A. H. Sayce, Mr. Le Page Renouf, Prof. Terrien de la Couperie, Mr. Boscawen, and Mr. Pinches.

Astar'te, a Syrian goddess, probably corresponding to the Semele of the Greeks and the Ashtaroth of the Hebrews, and representing the productive power of nature. She was a moon-goddess. Some regard her as corresponding with Hera (Juno), and others with Aphrodite.

As'ter, a genus of plants, comprehending several hundred species, mostly natives of North America, although others are widely distributed. Many are cultivated as ornamental plants. Asters generally flower late in the season, and some are hence called Michaelmas or Christmas Daisies. The China Aster is a very showy annual, of which there are many varieties.

Aste'rla, a name applied to a variety of corundum, which displays an opalescent star of six rays of light when cut with certain precautions; and also to the *cat's-eye*, which consists of quartz, and is found especially in Ceylon.

Ås'teroids (or Planetoids), a numerous group of very small planets revolving round the sun between the orbits of Mars and Jupiter, re-markable for the eccentricity of their orbits and the large size of their angle of inclination to the ecliptic. The diameter of the largest is not supposed to exceed 450 mi., while most of the others are very much smaller. They number over 270, and new members are being constantly discovered. Ceres, the first of them, was discovered Jan. 1, 1801, and within three years more Pallas, Juno, and Vesta were The extraordinary smallness of these seen. bodies, and their nearness to each other, gave rise to the opinion that they were but the fragments of a planet that had formerly existed and had been brought to an end by some catastrophe. For nearly forty years investigations were carried on, but no more planets were discovered till Dec. 8, 1845, when a fifth planet in the same region was discovered. The rapid succession of discoveries that followed was for a time taken as a corroboration of the disruptive theory, but the breadth of the zone occupied makes the hypothesis of a shattered planet more than doubtful. Their mean distances from the sun vary between 200,000,000 and 300,000,000 mi.; the periods of revolution, between 1,191 days (Flora) and 2,868 (Hilda). Their eccentricities and inclinations are on the average greater than those of the earth, but their total mass does not exceed one fourth that of the earth.

Asthma (ast'ma), difficulty of respiration returning at intervals, with a sense of stricture across the chest and in the lungs, a wheezing, hard cough at first, but more free toward the close of each paroxysm, with a discharge of mucus, followed by a remission. Asthma is essentially a spasm of the muscular tissue which is contained in the smaller bronchial tubes. It generally attacks persons advanced in years, and seems, in some instances, to be hereditary. The exciting causes are various—accumulation of blood or viscid mucus in the lungs, noxious vapors, a cold and foggy atmosphere, or a close, hot air, flatulence, accumulated fæces, violent passions, organic diseases in the thoracic viscera, etc. By far the most important part of the treatment consists in the obviating or removing the several exciting causes. It seldom proves fatal except as inducing dropsy, consumption, etc. **Asti** (ås' tě), a town of Northern Lialy, prov-

Asti (ås' të), a town of Northern Italy, province of Alessandria, 28 mi. e.s.e. of Turin. In the Middle Ages it was one of the most powerful republics of Northern Italy. It was the birthplace of Alfieri, the poet, whose statue adorns the principal square. A favorite wine is produced in the neighborhood. Pop. 17.340.

Astig' matism, a malformation, congenital or accidental, of the lens of the eye, in consequence of which the individual does not see objects in the same plane, although they may really be so. It is due to the degree of convexity of the horizontal and vertical meridians being different, so that corresponding rays, instead of converging into one point, meet at two foci.

Astor, JOHN JACOB (1763-1848), an American capitalist, b. near Heidelberg, Germany; d. at New York. In 1783 he emigrated to the U. S., settled at New York, and became extensively engaged in the fur trade. In 1811 the settlement of Astoria, founded by him, near the mouth of the Columbia River, was formed to serve as a central depot for the fur trade between the lakes and the Pacific. He subsequently engaged in various speculations, and died worth \$20,000,000, leaving \$400,000 to found the Astor Library in New York. This institution is contained in a splendid building, enlarged in 1859 at the cost of his son, and comprises about 260,000 volumes. His descendants are the principal ground landlords of the city of New York. Astor, WILLIAM (1792-1875), sou of John

Astor, WILLIAM (1792-1875), sou of John Jacob Astor, carried on the enormous business interests of his father and is said to have left \$50,000,000. He added \$200,000 to his father's bequest for a public library. He was known as the *landlord of New York*, from the extent of his property in that city.

Astor, WILLIAM WALDORF, b. 1848, son of J. J. Astor. Elected to state legislature, 1877, and to state senate in 1870. Was envoy and minister plenipotentiary to Italy, 1882-85. He inherited the greater part of the enormous Astor estate in 1890. He is now living in England.

Astoria, Clatsop co., Ore., U. S., on the Columbia River, with numerous salmon-canning establishments. Pop. 7,071.

Astrabad', a town of Persia, capital of a province of the same name on the Caspian. It was formerly the residence of the Kajar princes, the ancestors of the present Persian dynasty. It is very unhealthy, and has been called the *City of the Plague*. Pop. est. 16,500.



Astræ'a, in Greek mythology, the daughter of Zeus and Themis, and goddess of justice. During the Golden Age she dwelt on earth, but on that age passing away she withdrew from the society of men and was placed among the stars, where she forms the constellation Virgo. The name was given to one of the asteroids, discovered in 1845. It revolves around the sun in 1,511.10 solar days, and is about 2‡ times the distance of the earth from the sun.

Astrag'alus, the upper bone of the foot supporting the tibia; the huckle, ankle, or sling bone. It is a strong, irregularly shaped bone, and is connected with the others by powerful ligaments.

Astrakhan (ås-trå-hån'), a Russian city, capital of government of same name. The manufactures are large and increasing, and the fisheries (sturgeon, etc.) very important. It is the chief port of the Caspian, and has regular steam communication with the principal towns on its shores. Pop. 57,704, composed of various races. The government has an area of 85,000 sq. mi. It consists almost entirely of two vast *steppes*, separated from each other by the Volga, and forming for the most part arid sterile deserts. Pop. 766,840.

Astrakhan, a name given to sheep-skins with a curled, woolly surface obtained from a variety of sheep found in Bokhara, Persia, and Syria; also a rough fabric with a pile in imitation of this.

Astrin' gent, a medicine which contracts the organic textures and canals of the body, thereby checking or diminishing excessive discharges. The chief astringents are the mineral acids, alum, lime-water, chalk, salts of copper, zinc, iron, lead, silver; and among vegetables, catechu, kino, oak-bark, and galls.

Astrol'ogy, literally, the science or doc-trine of the stars. The name was formerly used as equivalent to astronomy, but is now restricted in meaning to the pseudo-science which pretends to enable men to judge of the effects and influences of the heavenly bodies on human and other mundane affairs, and to foretell future events by their situations and conjunctions. As usually practised the whole heavens, visible and invisible, was divided by great circles into twelve equal parts, called houses. As the circles were supposed to remain immovable every heavenly body passed through each of the twelve houses every twenty-four hours. The portion of the zodiac contained in each house was the part to which chief attention was paid, and the position of any planet was settled by its distance from the boundary circle of the house, measured on the ecliptic. The houses had different names and different powers, the first being called the house of life, the second the house of riches, the third of brethren, the sixth of marriage, the eighth of death, and so on. The part of the heavens about to rise was called the ascendant, the planet within the house of the ascendant being bird of the ascendant. The different aspects of the planets were of great importance. To cast a person's nativity (or draw his horoscope) was to find the position of the heavens at the in-

stant of his birth, which being done, the astrologer, who knew the various powers and influences possessed by the sun, the moon, and the planets, could predict what the course and termination of that person's life would be. The temperament of the individual was ascribed to the planet under which he was born, as saturnine from Saturn, jozial from Jupiter, mercurial from Mercury, etc., words which are now used with little thought of their original meaning. The virtues of herbs, gems, and medicines were supposed to be due to their ruling planets.

Astron'omy is that science which investigates the motions, distances, magnitudes, and various phenomena of the heavenly bodies. That part of the science which gives a description of the motions, figures, periods of revolution, and other phenomena of the heavenly bodies is called *descriptive astronomy*; that part which teaches how to observe the motions, figures, periodical revolutions, distances, etc., of the heavenly bodies, and how to use the necessary instruments, is called practical astronomy; and that part which explains the causes of their motions, and demonstrates the laws by which those causes operate, is termed physical astronomy. Recent years have added two new fields of investigation which are full of promise for the advancement of astronomical science. The first of these-celestial photography-has furnished us with invaluable light-pictures of the sun, moon, and other bodies, and has recorded the existence of myriads of stars invisible even by the best telescopes; while the second, spectrum analysis, reveals to us a knowledge of the physical constituents of the universe, telling us for instance that in the sun (or his atmosphere) there exist many of the elements familiar to us on the earth. It has also been applied to the determination of the velocity with which stars are approaching to, or receding from, our system; and to the measurement of movements taking place within the solar atmospheric envelopes. From analysis of some of the unresolved nebulæ the inference is drawn that they are not starswarms but simply cosmical vapor; whence a second inference results favorable to the hypothesis of the gradual condensation of nebulæ, and the successive evolutions of suns and systems.

The most remote period to which we can go back in tracing the history of astronomy refers us to a time about 2500 B. C., when the Chinese are said to have recorded the simultaneous conjunction of Saturn, Jupiter, Mars, and Mercury with the moon. This remarkable phenomenon is found, by calculating back-ward, to have taken place 2460 B.c. Astronomy has also an undoubtedly high antiquity in India. The mean annual motion of Jupiter and Saturn was observed as early as 3062 years B. C.; tables of the sun, moon, and planets were formed, and eclipses calculated. In the time of Alexander the Great, the Chaldeans or Babylonians had carried on astronomical observations for 1,900 years. They regarded comets as bodies traveling in extended orbits,

## Astronomy

and predicted their return; and there is reason to believe that they were acquainted with the true system of the universe. The priests of Egypt gave astronomy a religious character; but their knowledge of the science is testified to only by their ancient zodiacs and the position of their pyramids with relation to the cardinal points. It was among the Greeks that Thaastronomy took a more scientific form. les of Miletus (b. 639 B.C.) predicted a solar eclipse, and his successors held opinions which are in many respects wonderfully in accordance with modern ideas. Pythagoras (500 B. C.) promulgated the theory that the sun is the center of the planetary system. Great progress was made in astronomy under the Ptolemies, and we find Timochares and Aristyllus employed about 300 B. c. in making useful planetary observations. But Pristarchus of Samos (b. 267 B.C.) is said, on the authority of Archimedes, to have far surpassed them, by teaching the double motion of the earth around its axis and around the sun. A hundred years later Hipparchus determined more exactly the length of the solar year, the eccentricity of the ecliptic, the precession of the equinoxes, and even undertook a catalogue of the stars. It was in the second century after Christ that Claudius Ptolemy, a famous mathematician of Pelusium in Egypt, propounded the system that bears his name; viz., that the earth was the center of the universe, and that the sun, moon, and planets revolved around it in the following order: nearest to the earth was the sphere of the moon; then followed the spheres of Mercury, Venus, the Sun, Mars, Jupiter, and Saturn; then came the sphere of the fixed stars; these were succeeded by two crystalline spheres and an outer sphere named the primum mobile or first motion, which last was again circumscribed by the calum empyreum, of a cubic shape, wherein happy souls found their abode. The Arabs began to make scientific astronomical observations about the middle of the eighth century, and for 400 years they prosecuted the science with assiduity. Ibn-Yunis (1000 A. D.) made important observations of the disturbances and eccentricities of Jupiter and Saturn. In the sixteenth century Nicholas Copernicus, b. in 1473, introduced the system that bears his name, and which gives to the sun the central place in the solar system, and shows all the other bodies, the earth in-cluded, revolving around him. This arrangement of the universe came at length to be generally received on account of the simplicity it substituted for the complexities and contradictions of the theory of Ptolemy. The observations and calculations of Tycho Brahe, a Danish astronomer, b. in 1546, continued over many years, were of the highest value, and claim for him the title of regenerator of practical astronomy. His assistant and pupil, Kepler, b. in 1571, was enabled, principally by the aid he received from his master's labors, to arrive at those laws which have made his name famous: 1, That the planets move, not in circular, but in elliptical orbits, of which the sun occupies a focus. 2, That

the radius vector, or imaginary straight line joining the sun and any planet, moves over equal spaces in equal times. 3, That the squares of the times of the revolutions of the planets are as the cubes of their mean distances from the sun. Galileo, who died in 1642, advanced the science by his observations and by the new revelations he made through his telescopes, which established the truth of the Copernican theory. Newton, b. in 1642, carried physical astronomy suddenly to comparative perfection. Accepting Kepler's laws as a statement of the facts of planetary motion he deduced from them his theory of gravitation. The science was enriched toward the close of the eighteenth century by the dis-covery by Herschel of the planet Uranus and its satellites, the resolution of the Milky Way into myriads of stars, and the unraveling of the mystery of nebulæ and of double and triple stars. The splendid analytical re-searches of Lalande, Lagrange. Delambre, and Laplace mark the same period. The nineteenth century opened with the discovery of the first four minor planets: and the exist-ence of another planet (Neptune) more distant from the sun than Uranus, was, in 1845, simultaneously and independently predicted by Levertier and Adams. Of late years the sun has attracted a number of observers, the spectroscope and photography having been especially fruitful in this field of investigation. From recent transit observations the former calculated distance of the sun has been corrected, and is now given as 92,560,000 mi. An interesting recent discovery is that of the two satellites of Mars. The existence of an intra-Mercurial planet, which has been named Vulcan, has not yet been verified. Much valuable work has of late been accomplished in ascertaining the parallax of fixed stars.

The objects with which astronomy has chiefly to deal are the earth, the sun, the moon, the planets, the fixed stars, comets. nebulæ, and meteors. The stellar universe is composed of an unknown host of stars, many millions in number, the most noticeable of which have been formed into groups called constellations. The nebulæ are cloud-like patches of light scattered all over the heavens. Some of them have been resolved into star-clusters, but many of them are but masses of incandescent gas. A favorite theory regarding the fixed stars is that they form a system to which our sun belongs, and that many of the nebulæ are similar systems situated far outside of our own. The fixed stars preserve, at least to unaided vision, an unalterable relation to each other, because of their vast distance from the Their apparent movement from east earth. to west is the result of the earth's revolution on its axis in twenty-four hours from west to east. The planets have not only an apparent, but also a real and proper motion, since, like our earth, they revolve around the sun in their several orbits and periods. The nearest of these bodies to the sun-unless the hypothetical Vulcan really exists — is Mercury. Venus, the second planet from the sun, is the bright-

est and most beautiful of all the planets. The Earth is the first planet accompanied by a sat-ellite or moon. Mars, the next planet, has two satellites, as already mentioned. Its surface has a variegated character, and the existence of land, water, snow, and ice has been assumed. The Asteroids, of which over 270 have been observed, form a broad zone of small bodies circulating in the space between Mars and Jupiter. Jupiter, the largest planet of the system, has four satellites, discovered by Galileo, and is marked by dark bands or belts on each side of the equator. Saturn, with his eight moons, and his broad thin rings with edges turned toward the planet, is, perhaps, the most striking telescopic object in the heavens. Uranus-discovered by Herschel in 1781-is accompanied by four satellites. Neptune, the farthest removed from the sun, has one satellite, the motion of which is retrograde. Besides the planets, quite a number of comets are known to be members of the solar system. The physical constitution of these bodies is still one of the enigmas of astronomy. The observation of meteors has recently attracted much attention. They most frequently occur in the autumn, and have been supposed to be Moon, Planet, Comets. See articles, Earth, Sun, Moon, Planet, Comet, Stars, Mercury, Venus, Mars, Jupiter, Baturn, Asteroids. Astu'ria (or The Asturias), a Spanish prin-

Astu'ria (or The Asturias), a Spanish principality, now forming the province of Oviedo, on the north coast of Spain; an Alpine region, with steep and jagged mountain ridges, valuable minerals, luxuriant grazing lands, and fertile, well-watered valleys. The hereditary prince of Spain has borne since 1388 the title of Prince of the Asturias.

Asty' ages (-jēz), the last king of the Medes, (593-558 B.C.), deposed by Cyrus, an event which transferred the supremacy from the Medes to the Persians.

Asuncion (ä-soon'sē-on) (or Nuestra Señora de la Asuncion), the chief city of Paraguay. It was founded in 1536 on the feast of the Assumption. Its trade is mostly in the yerba tea, hides, tobacco, oranges, etc. It was taken and plundered by the Brazilians in 1860, and some of the leading buildings still remain in a half-ruined condition. A railway runs for a short distance into the interior. Pop. 24,838.

Atacama (å-tå-kä'må), a desert region on the west coast of South America belonging to Chile. It forms the chief mining district of Chile, there being here rich silver mines, while gold is also found as well as argentiferous lead, copper, nickel, cobalt, and iron; with guano on the coast. The northern portion, till recently, belonged to Bolivia. The Chilean prov. of Atacama has an area of 43,180 sq. mi., and a pop. of 66,067.

Ataca' mite, a mineral consisting of a combination of the protoxide and chloride of copper, occurring abundantly in some parts of South America, as at Atacama, whence it has its name. It is worked as an ore in South America, and is exported to England.

Atahual' pa, the last of the Incas, succeeded

his father in 1529 on the throne of Quito, while his brother Huascar obtained the kingdom of Peru. They soon made war against each other, when the latter was defeated, and his kingdom fell into the hands of Atahualpa. The Spaniards, with Pizarro at their head, invaded Peru, and advanced to Atahualpa's camp. Atahualpa was captured, and despite the payment of a vast ransom in gold, was executed (1533).

Atalan 'ta, in the Greek mythology, a famous huntress of Arcadia. She was to be obtained in marriage only by him who could outstrip her in a race, the consequence of failure being death. One of her suitors obtained from AphrodItö (Venus) three golden apples, which he threw behind him, one after another, as he ran. Atalanta stopped to pick them up, and was not unwillingly defeated. There was another Atalanta belonging to Bœotia, who cannot very well be distinguished, the same stories being told about both.

**Ataxy** (Ataxia), in medicine, irregularity in the animal functions, or in the symptoms of a disease. See *Locomotor ataxy*.

Atchafalay'a ("Lost Water"), a river of the U. S., an outlet of the Red River which strikes off before the junction of that river with the Mississippi, flows southward, and enters the Gulf of Mexico by Atchafalaya Bay. Its length is 250 mi.

Atchison, Atchison co., Kan., on the Missouri, about 20 mi. from Kansas City, an important railway center with an increasing trade. Pop. 18,102. A'te, among the Greeks, the goddess of

A'te, among the Greeks, the goddess of hate, injustice, crime, and retribution, daughter of Zeus according to Homer, but of Eris (Strife) according to Hesiod.

Atesh'ga (the place of fire), a sacred place of the Guebres or Persian fire-worshipers, on the peninsula of Apsheron, on the w. coast of the Caspian, visited by large numbers of pilgrims, who bow before the sacred flames which issue from the bituminous soil.

Athabas'ca, a river, lake, and district of Canada. LAKE ATHABASCA, or Lake of the Hills, is about 190 mi. s.s.e. of the Great Slave Lake, with which it is connected by means of the Slave River, a continuation of the Peace. It is about 200 mi. in length from east to west, and about 35 mi. wide at the broadest part, but gradually narrows to a point at either extremity. The district of ATHABASCA, formed in 1882, lies immediately e. of British Columbia, and n. of Alberta. Area about 122,000 sq. mi. It is intersected by the Athabaska and the Peace Rivers, and as yet has a scanty population. The name is also given to a family of Indians.

Athali'ah, daughter of Ahab, king of Israel, and wife of Joram, king of Judah. After the death of her son Ahaziah, she opened her way to the throne by the murder of forty-two princes of the royal blood. She reigned six years; in the seventh the high priest Jehoiada placed Joash, the young son

of Ahaziah, who had been secretly preserved, on the throne of his father, and Athaliah was slain. See 2 Kings 8:9, 11.

Ath'elney, formerly an island in the midst of fens and marshes, now drained and cultivated, in Somersetshire, England, about 7 mi. s.e. of Bridgewater. Alfred the Great took refuge in it during a Danish invasion, and afterward founded an abbey there.

Ath'elstan, King of England, b. 895, d. 941, succeeded his father, Edward the Elder, in 925. He was victorious in his wars with the Danes of Northumberland and the Scots, by whom they were assisted. After a single overthrow of his enemies at Brunanburgh he governed in peace and with great ability.

Athe'na (or Athene), a Greek goddess, the representative of the intellectual powers; the daughter of Zeus (Jupiter) and Metis. According to the legend, before her birth Zeus swallowed her mother, and Athena afterward sprang from the head of Zeus. She slew Pallas and Enceladus. In all representations she is the symbol of the thinking faculty, the god-dess of wisdom, science, and art. As a warrior she is represented completely armed, her head covered with a gold helmet. As the goddess of peaceful arts she appears in the dress of a Grecian matron. To her insignia belong the Ægis, the Gorgon's head, the round Argive buckler. All Attica, but particularly Athens, was sacred to her, and she had numerous temples there.

Athenæ'um, the temple of Athena (or Minerva), at Athens, frequented by poets, learned men, and orators. The same name was given at Rome to the school which Hadrian established on the Capitoline Mount for the promotion of literary and scientific studies. In modern times the same name is given to literary clubs and establishments connected with the sciences.

Ath'ens, anciently the capital of Attica and center of Greek culture, now the capital of the kingdom of Greece. It is situated in the central plain of Attica, about 4 miles from the Saronic Gulf (or Gulf of Ægina), an arm of the Ægean Sea running in between the mainland and the Peloponnesus. It is said to have been founded about 1550 B.C. by Cecrops, the mythical Pelasgian hero, and to have borne the name Cecropia until under Erechtheus it received the name of Athens in honor of Athenē. The Acropolis, an irregular oval crag 150 ft. high, with a level summit 1,000 ft. long by 500 in breadth, was the original nucleus of the city. The three chief eminences near the Acropolis -the Areopagus to the northwest, the Pnyx to the southwest, and the Museum to the south of the Pnyx-were thus included within the city boundary as the sites of its chief public buildings. On the east ran the Ilissus and on the west the Cephissus, while to the south-west lay three harbors, Phalerum, the Piræus, and Munychia. At the height of its prosperity the city was connected with its harbors by three massive walls. The architectural de-velopment of Athens may be dated from the rule of the Pisistratides (560-510 B.C.), who are

## Athens

credited with the foundation of the temple of the Olympian Zeus, completed by Hadrian seven centuries later, the erection of the Pythium and of the Lyceum; also the Academy and the building of the Agora, Senate-house, Tholus, and Prytanium. With the foundation of Athenian democracy under Clisthenes, the Pnyx or place of public assembly, with its semicircular area and cyclopean wall, first became of importance, and a commencement was made to the Dionysiac theater (theater of Dionysus, or Bacchus) on the south side of the Acropolis. After the destruction wrought by the Persians in 480 B.C., Themistocles reconstructed the city upon practical lines and with a larger area, enclosing the city in new walls 71 miles in circumference, erecting the north wall of the Acropolis, and developing the maritime resources of the Piræus; while Cimon added to the southern fortifications of the Acropolis, planted the Agora with trees, laid out the Academy, and built the Theseum. Under Pericles the highest point of artistic development was reached. An Odeium was erected on the east of the Dionysiac theater for the recitations of rhapsodists and musicians; and with the aid of the architects, lotinus and Mnesicles, and of the sculptor Phidias, the Acropolis was perfected. Covering the whole of the western end rose the Propyleea, of Pentelic marble and consisting of a central portico with two wings in the form of Doric temples. In the interval between the close of the Peloponnesian war and the battle of Chæronea few ad-ditions were made. Then, however, the long walls and Piræus, destroyed by Lysander, were restored by Conon, and under the orator Lycurgus the Dionysiac temple was completed, the Panathenaic stadium commenced, and the choragic monuments of Lysicrates and Thrasyllus erected. Later on Ptolemy Philadelphus gave it the Ptolemæum near the Theseum, Attalus I, the stoa northeast of the Agora. Eu-menes II, that near the great theater, and Antiochus Epiphanes carried on the Olympium. Under the Romans it continued a flourishing city, Hadrian in the second century adorning it with many new buildings. But after a time Christian zeal, the attacks of barbarians, and robberies of collectors made sad inroads among the monuments. About 420 A.D. paganism was totally annihilated at Athens, and when Justinian closed even the schools of the philosophers, the reverence for buildings associated with the names of the ancient deities and heroes was lost. The Parthenon was turned into a church of the Virgin Mary, and St. George stepped into the place of Theseus. Finally, in 1456, the place fell into the hands of the Turks. The Parthenon became a mosque, and in 1687 was greatly damaged by an explosion at the siege of Athens by the Venetians. Enough, however, remains of it and of the neighboring structures to abundantly attest the splendor of the Acropolis; while of the other buildings of the city, the Theseum and Horologium, or Temple of the Winds, are admirably preserved, as also are the Pnyx, Panathenaic stadium, etc. Soon after the

commencement of the war of liberation in 1821, the Turks surrendered Athens, but captured it again in 1826-27. It was then abandoned until 1830. In 1835 it became the royal residence, and made rapid progress. The modern city mostly lies northward and eastward from the Acropolis. Among the principal buildings are the royal palace, the university, the academy, public library, theater, and observatory. The university was opened in 1836, and has 1,400 students. There are valuable museums, in particular the National Museum and that in the Polytechnic School. These are constantly being added to by excavations. There are four foreign archeeological institutes, the French, German, American, and British. Street railroads have been made in the principal streets, and the city is connected by railway (6 miles) with its port, the Piræus. Pop. 85,000.

Athens, Athens co. O., on the Hocking River, the seat of the Ohio University, which was founded in 1804.

Athens, Clark co., Ga., on the Oconee River, is the seat of the Georgia University, which was founded in 1801. Pop. 81,700.

Athletes (ath'lēts), combatants who took part in the public games of Greece. The profession was an honorable one; tests of birth, position, and character were imposed and crowns, statues, special privileges, and pensions were among the rewards of success.

Athol, Worcester co., Mass., on Miller River; large manufactures of woolen and boots and shoes; 28 mi. from Worcester. Pop. 6,318.

Athletic Sports .- Although this term is undoubtedly derived from the ancients, the derivation does not exactly indicate its present meaning, inasmuch as our modern athletes are distinctly defined to be amateurs, in contradistinction to professionals. In fact the former pursue the agonistic art, and should be styled "agonistics," if we may be allowed to invent such a word, rather than athletes. How the pastime came to be thus named in Britain some thirty years ago, it is hard to say. Till about 1860, all exercises wherein the feet played the principal part were rightly styled "pedestrianism." Up to that period all prizes, whether contended for by amateurs or professionals, were invariably in money. As the practise of the pastime, however, rapidly spread among the former, it was naturally found they were loth to compete on the same terms with, and for similar trophies as, the latter. Hence arose the modern definition of an amateur athlete; viz., "any person who has never competed in an open competition, or for public money, or for admission money, or with professionals for a prize, public money, or admission money; nor has ever at any period of his life taught or assisted in the pursuit of athletic exercises, as a means of livelihood; nor is a mechanic, artisan, or laborer." The moment this definition was brought into force a wide barrier arose between the two classes, and amateurs ceased to compete for money prizes among themselves, or against professionals,

on any terms, unless they were willing to forfeit their status.

Athor (Hathor or Het-her), an Egyptian goddess, identified with Aphroditë (or Venus). Her symbol was the cow bearing on its head the solar disc and hawk-feather plumes. Her chief temple was at Denderah. From her the third month of the Egyptian year derived its name. A'thos (now Hagion Oros or Monte Santo,

that is, Holy Mountain), a mountain 6,700 ft. high in European Turkey, terminating the most eastern of the three peninsulas jutting into the Archipelago. The name, however, is frequently applied to the whole peninsula, which is about 30 mi. long by 5 broad. It is covered with forests, and plantations of olive, vine, and other fruit trees. The Persian fleet under Mardonius was wrecked here in 493 B. C., and to avoid a similar calamity Xerxes caused a canal, of which traces may yet be seen, to be cut through the isthmus that joins the peninsula to the mainland. On the peninsula there are situated about twenty monasteries and a multitude of hermitages, which contain from 6,000 to 8,000 monks and hermits of the order of St. Basil. The libraries of the monasteries are rich in literary treasures and manuscripts. Every nation belonging to the Greek Church has here one or more monasteries of its own, which are annually visited by pilgrims. The various religious communities form a species of republic, paying an annual tribute of nearly \$20,000 to the Turks, and governed by a synod of twenty monastic deputies and four presidents, meeting weekly. At the present day no Mohammedan, except the Aga Bostanji, who acts as an intermediary between the monks and the sultan, can settle on the peninsula. The revenue of the community is derived from pilgrims, and from a considerable trade in amulets, rosaries, crucifixes, images, and wooden furniture.

Atit'lan, a lake and mountain of Central America in Guatemala. The lake is about 24 mi. long and 10 broad; the mountain is an active volcano 12,160 ft. high.

Atkinson, EDWARD, b. at Brookline, Mass., 1827. He has written extensively on economic subjects, and is considered a high authority on questions of this character. He has written several articles on the silver question in the U. S.

Atian'ta, Fulton co., Ga., is an important railway center; carries on a large trade in grain, paper, cotton, flour, and especially tobacco, and possesses flour mills, paper mills, iron works, etc. Here are Atlanta University for colored male and female students, a theological college, a medical college, etc. Atlanta suffered severely during the Civil War. Pop. 70,256.

Atlan'tes (or Telamones), in architecture, male figures used in place of columns or pilasters for the support of an entablature or cornice. Female figures so employed are termed caryatides.

Atlantic City, Atlantic co., N. J., on Atlantic Ocean, 60 mi. s.e. of Philadelphia. Railroads: West Jersey; Camden & Atlantic; and Atlantic City. Surrounding country agricultural. It is a winter and summer health and pleasure resort, and has an elevated board walk 40 ft. wide and 4 mi. long. Pop. est. 1897, 23,000.

Atlantic Ocean, the vast expanse of sea lying between the west coasts of Europe and Africa and the east coasts of North and South America, and extending from the Arctic to the Antarctic Ocean; greatest breadth, between the west coast of Northern Africa and the east coast of Florida, 4,150 mi.; least breadth, between Norway and Greenland, 930 mi.; superficial extent, 25,000,000 sq. mi. The principal inlets and bays are Baffin's and Hudson's Bays, the Gulf of Mexico, the Caribbean Sea, the North Sea (or German Ocean), the Bay of Biscay, and the Gulf of Guinea. The principal islands north of the equator are Iceland, the Faroe and British Islands, the Azores, Canaries, and Cape Verd Islands, Newfoundland, Cape Breton, and the West India Islands; and south of the equator. Ascension, St. Helena, and Tristan da Cunha.

The great currents of the Atlantic are the Equatorial Current (divisible into the Main, Northern, and Southern Equatorial Currents), the Gulf-stream, the North African and Guinea Current, the Southern Connecting Current, the Southern Atlantic Current, the Cape Horn Current, Reunel's Current, and the Arctic Current. The current system is primarily set in motion by the trade-winds which drive the water of the intertropical region from Africa toward the American coasts. The Main Equatorial Current, passing across the Atlantic, is turned by the S. American coast, along which it runs at a rate of 30 to 50 miles a day, till, having received part of the North Equatorial Current, it enters the Gulf of Mexico. Issuing thence between Florida and Cuba under the name of the Gulf-stream, it flows with a gradually expanding channel nearly parallel to the coast of the U.S. It then turns northeastward into the mid-Atlantic, the larger proportion of it passing southward to the east of the Azores to swell the North African and Guinea Current created by the northerly winds off the Portuguese coast. The Guinea Current, which takes a southerly course, is divided into two on arriving at the region of the northeast trades, part of it flowing east to the Bight of Biafra and joining the South African feeder of the Main Equatorial, but the larger portion being carried westward into the North Equatorial drift. Rennel's Current, which is possibly a continuation of the Gulf-stream, enters the Bay of Biscay from the west, curves round its coast, and then turns northwest toward Cape Clear. The Arctic Current runs along the east coast of Greenland (being here called the Greenland Current), doubles Cape Farewell, and flows up toward Davis's Strait; it then turns to the south along the coasts of Labrador and the U.S., from which it separates the Gulf-stream by a cold band of water. Immense masses of ice are borne south by this current from the Polar seas. In the interior of the North Atlantic there is a large area comparatively free

from currents, called the Sargasso Sea, from the large quantity of sea-weed (of the genus Sargassum) which drifts into it. A similar area exists in the South Atlantic. In the South Atlantic, the portion of the Equatorial Current which strikes the American coast below Cape St. Roque flows southward at the rate of from 12 to 20 miles a day along the Brazil coast under the name of the Brazil Current. It then turns eastward and forms the South Connecting Current, which, on reaching the South African coast, turns northward into the Main and Southern Equatorial Currents. Besides the surface currents, an under current of cold water flows from the poles to the equator, and an upper current of warm water from the equator toward the poles.

The greatest depth yet discovered is north of Porto Rico, in the West Indies, namely 27.-360 feet. Cross-sections of the North Atlantic between Europe and America show that its bed consists of two great valleys lying in a north and south direction, and separated by a ridge, on which there is an average depth of 1,600 or 1,700 fathoms, while the valleys on either side sink to the depth of 3,000 or 4,000 fathoms. A ridge, called the Wyville-Thomson Ridge, with a depth of little more than 200 fathoms above it, runs from near the Butt of Lewis to Iceland, cutting off the colder water of the Arctic Ocean from the warmer water of the Atlantic. The South Atlantic, of which the greatest depth yet found is over 3,000 fathoms, resembles the North Atlantic in having an elevated plateau or ridge in the centre with a deep trough on either side. The saltness and specific gravity of the Atlantic gradually diminish from the tropics to the poles, and also from within a short distance of the tropics to the equator. In the neighborhood of the British Isles the salt has been stated at one thirty-eighth of the weight of the water. The North Atlantic is the greatest highway of ocean traffic in the world. It is also a great area of submarine communication, by means of the telegraphic cables that are laid across its bed.

Atiantic Telegraph.-J. J. Craven's experiment in 1847 led to the laying of a gutta-percha cable between New York and Jersey City, 1848. In 1850 an experimental line was laid across the English Channel, followed (1851) by a permanent cable. The plan to connect a line of fast steamers with a cable carried across the Island of St. Johns was next at-tempted. The New York, Newfoundland, & London Telegraph Co. began operations to connect St. Johns, Newfoundland, with telegraphic lines in the U. S. and British America. The first attempt to lay a cable (1855) across the Gulf of St. Lawrence failed. Another at-tempt (1856) succeeded. The idea of carrying the cable across the ocean originated with Mr. Cyrus W. Field of New York (1854). Mr. Field went to London (1856) and in face of many difficulties, organized the first Atlantic Telegraph Co., himself subscribing more than one fourth the capital, \$1,750,000. To this company were given all the privileges con-

ferred on the old company. The govern-ments of Great Britain and the U.S. gave substantial aid, and furnished ships for laying the cable. The Niagara and Agamemnon sailed west from Valentia, Ireland, Aug. 7, 1857, each bearing 1,250 mi. of the cable. The Niagara paid her portion out as she went. On August 11, 280 mi. out, the cable snapped, the end sinking in 2,000 fathoms of water, and the ships returned to Portsmouth. The same ships left Valentia again, June 10, 1858, for a second trial, submersion to begin in mid-ocean, one ship going east, the other west. On the 29th a double break occurred, 144 mi. of cable being lost. Even directors now lost faith. Still they prosecuted the work. July 29 the cable was again lowered in mid-ocean, this time with success. The Agamemnon ar-rived at Valentia, Ireland, August 6, and the Niagara at Trinity Bay, N. F. about the same time, both having successfully lowered their portion of the cable. August 17 the following message was flashed through the ocean: "Europe and America are united by telegraph. Glory be to God in the highest; on earth peace and good-will toward men." The Newfoundland station was connected with the general telegraph system of America, and the station at Valentia with the general system of Europe. This cable continued in good working order until Sept. 1, 1858.

From 1858-1864 Mr. Field was busy raising new capital. The Telegraph Construction and Maintenance Co. was formed. This company constructed cable much thicker and more costly than the other. The Great Eastern was enlisted in the laying, and steamed away from Valentia, July 23, 1865. The cable snapped, August 2, and the end sunk in 2,000 fathoms of water 1,064 mi. from land. Dredging to bring up the end proved unavailing and the Great Eastern returned. A new capital was raised and a new cable weighing 500 pounds per mi. less was made. July 13, 1866, the *Great Eastern* again left Valentia accompanied by the steamers Terrible, Midway, and Albany. The route chosen was midway be-tween the cables of 1858 and 1865. Success attended this attempt and the Great Eastern reached Heart's Content, N. F., July 27. The end of the 1865 cable was raised September 1, spliced with additional lengths, and laid to Heart's Content. Thus a second line of communication was established between America and Ireland. These two cables have been kept in good working order, and the heavy expenditures have yielded good dividends.

Atlan tis, an island which, according to Plato, existed in the Atlantic over against the Pillars of Hercules (Straits of Gibraltar), was the home of a great nation, and was finally swallowed up by the sea. The legend has been accepted by some as fundamentally true; but others have regarded it as the outgrowth of some early discovery of the New World.

At'las, an extensive mountain system in North Africa, starting near Cape Nun on the Atlantic Ocean, traversing Morocco, Algiers, and Tunis, and terminating on the coast of the Mediterranean; divided generally into two parallel ranges, running w. to e., the Greater Atlas lying toward the Sahara and the Lesser Atlas toward the Mediterranean. The principal chain is about 1,500 mi. long, and the principal peaks rise above or approach the line of perpetual congelation; Miltsin in Morocco being 11,500 feet high, and another peak in Morocco 11,500 feet high. The highest elevations are perhaps over 13,000 feet. Silver, antimony, lead, copper, iron, etc., are among the minerals. The vegetation is.chiefly European in character, except on the low grounds and next the desert.

Atlas, in Greek mythology, the name of a Titan whom Zeus condemned to bear the vault of heaven. The same name is given to a collection of maps and charts, and was first used by Gerard Mercator in the sixteenth century, the figure of Atlas bearing the globe being given on the title-pages of such works.

At'mosphere, primarily the gaseous envelope which surrounds the earth; but the term is applied to that of any orb. The atmosphere of the earth consists of a mass of gas extending to a height variously estimated at from 45 to 212 mi., and pressing on every part of the earth's surface with a pressure of about 15 (14.73) lbs. per sq. in. The existence of this atmospheric pressure was first proved by Torricelli, who thus accounted for the rush of a liquid to fill a vacuum, and who, working out the idea, produced the first barometer. The the idea, produced the first barometer. average height of the mercurial column, counterbalancing the atmospheric weight at the sea-level, is a little less than 30 in.; but the pressure varies from hour to hour, and roughly speaking, diminishes geometrically with the arithmetical increase in altitude. Of periodic variations there are two maxima of daily pressure occurring, when the temperature is about the mean of the day, and two minima, when it is at its highest and lowest respectively; but the problems of diurnal and seasonal oscillations have yet to be fully solved. The pressure upon the human body of average size is no less than 14 tons, but as it is ex-erted equally in all directions no inconvenience is caused by it. It is customary to take the atmospheric pressure as the standard for measuring other fluid pressures; thus the steam pressure of 30 lbs. per sq. in. on a boiler is spoken of as a pressure of two atmospheres.

The atmosphere, first subjected to analysis by Priestley and Scheele in the latter part of the eighteenth century, consists of a mixture of oxygen and nitrogen in the almost constant proportion of 20.81 volumes of oxygen to 79.10 volumes of nitrogen, or, by weight, 23.01 parts of oxygen to 76.99 of nitrogen. The gases are associated together, not as a chemical compound, but as a mechanical mixture. Upon the oxygen present depends the power of the atmosphere to support combustion and respiration, the nitrogen acting as a diluent to prevent its too energetic action. Besides these gases, the air contains aqueous vapor in variable quantity, ozone, carbonic acid gas, traces of ammonia, and, in towns, sulphuretted hydrogen and sulphurous acid gas. After thunderstorms, nitric acid is also observable. In addition to its gaseous constituents the atmosphere is charged with minute particles of organic and inorganic matter.

Atmospheric Electricity, the electricity manifested by the atmosphere, and made sensibly observable in the lightning flash.

Atmospheric Railway. See Pneumatic Dispatch.

Atomic Theory, a theory as to the existence and properties of atoms; especially, in chemistry, the theory accounting for the fact that in compound bodies the elements combine in certain constant proportions, by assuming that all bodies are composed of ultimate atoms, the weight of which is different in different kinds of matter. It is associated with the name of Dalton, who systematized and extended the imperfect results of his predecessors. On its practical side the atomic theory asserts three Laws of Combining Proportions: 1, the Law of Constant or Definite Proportions, teaching that in every chemical compound the nature and proportion of the constituent elements are definite and invariable; thus, water invariably consists of 8 parts by weight of oxygen to 1 part by weight of hydrogen; 2, the Law of Combination in Multiple Proportions, according to which the several proportions in which one element unites with another invariably bear toward each other a simple relation; thus, 1 part by weight of hydrogen unites with 8 parts by weight of oxygen to form water, and with 16 parts (i. e.,  $8 \times 2$ ) of oxygen to form peroxide of hydrogen; 3, the Law of Combination in Reciprocal Proportions, that the proportions in which two elements combine with a third also represent the proportions in which, or in some simple multiple of which, they will themselves combine; thus, in olefant gas, hydrogen is present with carbon in the proportion of 1 to 6; and in carbonic oxide, oxygen is present with carbon in the proportion of 8 to  $\hat{0}$ , 1 to 8 being also the proportions in which hydrogen and oxygen combine with each other. The theory that these proportional numbers are, in fact, nothing else but the relative weights of atoms so far accounts for the phenomena that the existence of these laws might have been predicted by the aid of the atomic hypothesis long before they were actually dis-covered by analysis. In themselves, however, the laws do not prove the theory of the existence of ultimate particles of matter of a certain relative weight; and although many chemists, even without expressly adopting the atomic theory itself, have followed Dalton in the use of the terms atom and atomic weight, in preference to proportion, combining proportion, equivalent, and the like, yet in using the word atom it should be held in mind that it merely denotes the proportions in which elements unite. These will remain the same whether the atomic hypothesis which suggested the employment of the term be true or false. Dal-ton supposed that the atoms of bodies are spherical, and invented certain symbols to represent the mode in which he conceived they might combine.

**Atoms**, according to the hypothesis of some philosophers, the primary parts of elementary matter not further divisible. The principal theorists of antiquity upon the nature of atoms were Moschus of Sidon, Leucippus (510 B. C.), Democritus, Epicurus, and Lucretius. These philosophers explained all phenomena on the theory of the existence of atoms possessing various properties and motions, and are hence sometimes called Atomists. Among the moderns, Gassendi illustrated the doctrine of Epicurus. Descartes formed from this his system of the vortices. Newton and Boerhaave supposed that the original matter consists of hard, ponderable, impenetrable, inactive, and immutable particles, from the variety in the composition of which the variety of bodies originates. According to Boscovich every atom is an indivisible point possessing position, mass, and potential force or capacity for attraction and repulsion. Upon the discovery of Helmholtz that a vortex in a perfect liquid possesses certain permanent characteristics, Sir W. Thomson has based a theory that atoms are vortices in a homogeneous, incompressible, and frictionless fluid. As to chemical atoms. see Atomic Theory.

Atreus (at'rūs), in Greek mythology, a son of Pelops and HippodamIa, grandson of Tantälus and progenitor of Agamemnon. He succeeded Eurystheus, his father-in-law, as king of Mycēnæ, and in revenge for the seduction of his wife by his brother Thyestes gave a banquet at which the latter partook of the flesh of his own sons. Atreus was killed by Ægisthus, a son of Thyestes. The tragic events connected with this family furnished materials to some of the great Greek dramatists.

At'rophy, a wasting of the flesh due to some interference with the nutritive processes. It may arise from a variety of causes, such as permanent, oppressive, and exhausting passions, organic disease, a want of proper food or of pure air, suppurations in important organs, copious evacuations of blood, saliva, semen, etc., and it is also sometimes produced by poisons; for example, arsenic, mercury, lead, in miners, painters, gilders, etc. In old age the whole frame except the heart undergoes atrophic change, and it is of frequent occurrence in infancy as a consequence of improper, unwholesome food, exposure to cold, damp, or impure air, etc. Single organs or parts of the body may be affected irrespective of the general state of nutrition; thus local atrophy may be superinduced by palsies, the pressure of tumors upon the nerves of the limbs, or by artificial pressure, as in the feet of Chinese ladies.

At'ropos, the eldest of the Fates, who cuts the thread of life with her shears.

Att'aius, the names of three kings of ancient Pergamus, 241–133 B. c., the last of whom bequeathed his kingdom to the Romans. They were all patrons of art and literature.

At'tar, in the East Indies, a general term for a perfume from flowers; in Europe, gener-

# Attenuation

ally used only of the attar or otto of roses, an essential oil made from the hundred-leaved or cabbage rose, damask rose, or musk rose, etc., 100,000 roses yielding only 180 grains of attar. Cashmere, Shiraz, and Damascus are celebrated for its manufacture, and there are extensive rose farms in the valley of Kezanlik in Roumelia and at Ghazipur in Benares. The oil is at first greenish, but afterward it presents various tints of green, yellow, and red. It is concrete at all ordinary temperatures, but becomes liquid about  $84^{\circ}$  F. It is frequently adulterated with the oils of rhodium, sandalwood, and geranium, with the addition of camphor or spermaceti.

Atten 'uation, in brewing, the change which takes place in the saccharine wort during fermentation by the conversion of sugar into alcohol and carbonic acid, with diminution of specific gravity.

Attic, an architectural term variously used. An *Attic base* is a peculiar kind of base, used by the ancient architects in the Ionic order, and by Palladio and some others in the Doric. An *Attic story* is a low story in the upper part of a house rising above the main portion of the building. In ordinary language an attic is an apartment lighted by a window in the roof.

At'tica, a state of ancient Greece, the capital of which, Athens, was once the first city in the world. Now a province of Greece. Pop. 185,364.

At 'ticus, TrTUS POMPONIUS (109-32 B. C.), a Roman of great wealth and culture. He so identified himself with Greek life and literature as to receive the surname Atticus. Sulla and the Marian party, Cæsar and Pompey, Brutus and Antony, were alike friendly to him, and he was in favor with Augustus. Of his close friendship with Cicero proof is given in the series of letters addressed to him by Cicero.

At' tila, the famous leader of the Huns, was the son of Mundzuk, and the successor, in conjunction with his brother Bleda, of his uncle Rhuas. The rule of the two leaders extended over a great part of Northern Asia and Europe, and they threatened the Eastern Empire, and twice compelled the weak Theodosius II to purchase an inglorious peace. Attila caused his brother Bleda to be murdered, 444, and in a short time extended his dominion over all the peoples of Germany. Attila died on the night of his marriage with Hilda (or Ildico), 453, either from the bursting of a blood-vessel or by her hand. The description that Jornandes has left us of him is in keeping with his Kalmuck-Tartar origin. He had a large head, a flat nose, broad shoulders, and a short and ill-formed body; but his eyes were brilliant, his walk stately, and his voice strong and well-toned

Attieborough, Bristol co., Mass. Pop. 15,-260.

Attrac'tion, the tendency of all material bodies, whether masses or particles, to approach each other, to unite, and to remain united. It was Newton that first adopted the theory of a universal attractive force, and determined its laws. When bodies tend to come together from sensible distances the tendency is termed either the attraction of gravitation, magnetism, or electricity, according to circumstances; when the attraction operates at insensible distances it is known as adhesion with respect to surfaces; as cohesion with respect to the particles of a body; and as affinity when the particles of different bodies tend together. It is by the attraction of gravitation that all bodies fall to the earth when unsupported.

At'tribute in philosophy, a quality or property of a substance, as whiteness or hardness. A substance is known to us only as a congeries of attributes. In the fine arts an attribute is a symbol regularly accompanying and marking out some personage. Thus the caduceus, purse, winged hat, and sandals are attributes of Mercury, the trampled dragon of St. George.

Attwood, GEORGE (1745-1807), an English mathematician, best known by his invention, called after him Attwood's Machine, for verifying the laws of falling bodies. It consists essentially of a freely moving pulley over which runs a fine cord with two equal weights suspended from the ends. A small, additional weight is laid upon one of them, causing it to descend with uniform acceleration. Means are provided by which the added weight can be removed at any point of the descent, thus allowing the motion to continue from this point onward with uniform velocity.

Aube (5b), a northeastern French department. Area 2,351 sq. mi.; pop. 257,374. The surface is undulating and watered by the Aube, etc. The n. and n.w. districts are bleak and infertile, the southern districts remarkably fertile. A large extent of ground is under forests and vineyards, and the soil is admirable for grain, pulse, and hemp. The chief manufactures are worsted and hosiery. Troyes is the capital. The river Aube, which gives name to the department, rises in Haute-Marne, flows n.w., and after a course of 113 mi. joins the Seine.

Auber (ö-bär), Daniel François Esprit (1782-1871), a French operatic composer. He was originally intended for a mercantile career, but devoted himself to music, studying under Cherubini. His first great success was his opera La Bergére Châtclaine, produced in 1820. In 1822 he had associated himself with Scribe as librettist, and other operas now followed in quick succes-Chief among them were Masuniello sion. or La Muette de Portici (1828), Fra Diarolo (1830), Lestocq (1834), L'Ambassadrice (1836), Le Domino Noir (1837), Les Diamants de la Couronne (1841), Marco Spada (1853), La Fiancie du Roi de Garbe (1864). Despite his success in Masaniello, his peculiar field was comic opera, which, bearing strongly the stamp of French national character, won him a high place.

Auburn, Cayuga co., N. Y., on Owasco outlet, 2 mi. n. of Owasco Lake. Railroads: N. Y. C., & H. R. Ry.; Lehigh Valley (Auburn division). Industries: agricultural machinery and implements, three flouring mills,

#### Auburn

two iron foundries, two woolen mills, three shoe factories, carpet and bicycle factories, and a number of others. Located at Auburn is one of the three state prisons, which was built in 1817, and the Auburn Theological Seminary. The town was first settled in 1792 and became a city in 1848. Pop. est. 1897, 30,000

Auburn, Androscoggin co., Me., a commercial center on Androscoggin river. Pop. 12,500.

Aubusson (ô-bü-sôn), a town of the interior of France, dep. Creuse, celebrated for its carpets. Pop. 6,723.

**Auch** ( $(\delta sh)$ , a town of s. w. France, capital of dep. Gers; the seat of an archbishop, with one of the finest Gothic cathedrals in France; manufactures linens, leather, etc. Pop. 9,670.

Auck land, a town of New Zealand, situated on Waitemata Harbor, one of the finest harbors of New Zealand. It has a large trade, there being connection with the chief places on the island by rail, and regular communication with the other ports of the colony, Australia, and Fiji by steam. It was formerly the capital of the colony. Pop., including suburbs, 57,048. The provincial district of Auckland forms the northern part of North Island, with an area of 36,000 sq. mi; pop. 112,000. The surface is very diversified; volcanic phenomena are common, including geysers, hot lakes, etc.; rivers are numerous; wool, timber, kauri-gum, etc., are exported. Much gold has been obtained in the Thames Valley and elsewhere.

Auction is a public sale to the party offering the highest price where the buyers bid upon each other, or to the bidder who first accepts the terms offered by the vendor where he sells by reducing his terms until some one accepts them. The latter form is known as a *Dutch Auction*. A sale by auction must be conducted in the most open and public manner possible; and there must be no collusion on the part of the buyers. Puffing or mock bidding to raise the value by apparent competition is illegal.

Aude (od), a maritime department in the s. of France. Area 2,437 sq. mi. The wines, especially white, bear a good name; olives and other fruits are also cultivated. The manufactures are varied; the trade is facilitated by the Canal du Midi. Carcassonne is the capital; other towns are Narbonne and Castelnaudary. Pop. 332,080. The river Aude rises in the eastern Pyrenees, and flowing nearly parallel to the Canal du Midi falls into the Mediterranean, after a course of 130 mi.

Au'diphone, an acoustic instrument by means of which deaf persons are enabled to hear. It consists essentially of a fan-shaped plate of hardened caoutchouc, which is bent to a greater or less degree by strings, and is very sensitive to sound-waves. When used the up edge is pressed against the upper front teeth, with the convexity outward, and the sounds being collected are conveyed from the teeth to the auditory nerve without passing through the external ear.

Auditorium Building, Chicago. This building includes the Auditorium which has a permanent seating capacity of over 4,000, which can be increased for conventions, etc., to about 8,000. It has the most costly stage and organ in the world, recital hall with a seating capacity of over 500; the business portion with stores and 136 offices; tower observatory to which the public are admitted; the U.S. signal service occupies the 17th, 18th, and 19th floors of the tower; the hotel has 400 guest rooms and a dining room 175 ft. long, a banquet hall, on which \$30,000 was expended for decorating, built of steel trusses, spanning 120 ft. over the Auditorium. This building was started in January, 1887, and finished in October, 1889. It covers It covers about one and a half acres, and has a street frontage of 710 ft. The height of the main building is 145 ft., total height of tower 270 ft. The entire weight of the building is 110,000 tons. There are 25 mi. of gas and water pipe, 230 mi. of electric wire and cable, 11 mi. of steel cable for moving scenes on the stage. electric dynamos and hydraulic motors, and

26 hydraulic lifts for moving stage platforms. Audran (ö-drän), a family of celebrated French engravers. The most noted were Gerard (1640-1703); Benoît (1661-1721); Claude pere (1592-1677); Claude fils (1640-84); Germain (1631-1710): Jean (1667-1756).

Au'dubon, JOHN JAMES (1780-1851), an American naturalist of French extraction. He was educated in France, and studied painting under David. In 1798 he settled in Pennsylvania, but having a great love for ornithology, he set out, in 1810, with his wife and child, descended the Ohio, and for many years roamed the forests in every direction drawing the birds which he shot. In 1826 he went to England, exhibited his drawings in Liverpool, Manchester, and Edinburgh, and finally published them in an unrivaled work of doublefolio size, with 435 colored plates of birds the size of life (The Birds of America, 4 vols., 1827-39), with an accompanying text (Ornithological Biography, 5 vols., 8 vo., partly written by Prof. Macgillivray). On his final return to America he labored with Dr. Bachman on a finely illustrated work entitled The Quadrupeds of America (1843-50, 3 vols.). He d. at New York.

Auerbach (ou'ér-bäk), BERTHOLD (1812-1882), a distinguished German author of Jewish extraction. He abandoned the study of Jewish theology in favor of philosophy, publishing in 1836 his Judaism and Modern Literature and a translation of the works of Spinoza with critical biography. His later works were tales or novels and his Village Tales of the Black Forest, as well as others of his writings, have been translated into several languages. Other works: Barfüssell; Joseph im Scance; Edelweiss; Auf der Höhe; Das Landhaus am Rhein; Waldfried; Brinitta.

Augeas (a-je'as), a fabulous king of Elis, in Greece, whose stable contained 3,000 oxen, and had not been cleaned for thirty years. Hercules undertook to clear away the filth in one day in return for a tenth part of the cattle, and executed the task by turning the river Alphõus through it. Augeas, having broken the bargain, was deposed and slain by Hercules.

Augite (a'jit) (or Pyroxene), a mineral of the hornblende family, an essential component of many igneous rocks, such as basalt, greenstone, and porphyry, A transparent green variety found at Zillerthal, in the Tyrol, is used in jewelry.

Augsburg (ougz'burh), a city of Bavaria, renowned commercial center in the Middle Ages, and is still an important emporium of south German and Italian trade. Industries: cotton spinning and weaving, dyeing, woolen manufacture, machinery and metal goods, books and printing, chemicals, etc. The Emperor Augustus established a colony here about 12 B. c. In 1276 it became a free city, and besides being a great mart for the commerce between the north and south of Europe it was a great center of German art in the Middle Agres. It early took a conspicuous part in the Reformation. In 1806 it was incorporated in Bavaria. Pop. 65,476.

Augur, Christopher Colon, b. 1821, in New York, graduated at West Point in 1843, served in the Mexican War and on the frontier, and was made a brigadier-general of volunteers in November, 1861. He fought at Cedar Mountain and at the siege of Port Hudson, and received the brevet of major-general for dis-tinguished services in the field in 1865. In 1885 he was retired under the rule.

Au'gurs, a board or college of diviners who, among the Romans, predicted future events and announced the will of the gods from the occurrence of certain signs. These consisted of signs in the sky, especially thunder and lightning; signs from the flight and cries of birds; from the feeding of the sacred chickens; from the course taken or sounds uttered by various quadrupeds or by serpents; from accidents or occurrences, such as spilling the salt, sneezing, etc. The answers of the augurs, as well as the signs by which they were governed, were called auguries, but bird-predictions were properly termed auspices. Nothing of consequence could be undertaken without consulting the augurs, and by the mere utterance of the words alio die ("meet on another day") they could dissolve the assembly of the people and annul all decrees passed at the meeting.

Au'gust, the eighth month from January. It was the sixth of the Roman year, and hence was called Sextilis till the Emperor Augustus affixed to it his own name.

Augusta (ou-gus'tà) (or Agos'ta), a seaport

in the s.e. of Sicily, 12 mi. n. of Syracuse. It exports salt, oil, honey, etc. Pop. 13.286. Augusta, Kennebec co., Me., on Kennebec river, 6 mi. n. of Gardiner. Railroads: Maine Central & Augusta, Hallowell & Gardiner Electric road. Industries: large cotton mills, sash and door factories, lumber, and fiber. Surrounding country agricultural. The town was first settled in 1754. It was an Indian trading post in 1628, known as Cushnoe, and in 1754 it became an outport of the Plymouth Company, known as Fort Western. The town

was incorporated as Hallowell in 1771, and the name changed to Harrington in 1797, and the same year the name was changed to Augusta. Augusta was made the capital of Maine in 1827 and became a city in 1849. Pop. est. 1897, 13,000.

Augusta, Richmond co., Ga., on the left bank of the Savannah River, 231 mi. from its mouth; well built, and connected with the river by high-level canals; an important manufacturing center, having cotton mills, machine shops, and railroad works. etc. Pop, 33,300.

Au'gustine, AURELIUS AUGUSTINUS, ST. (354-430), a renowned father of the Christian Church. He was a man of great enthusiasm, powerful intellect, and wielded a powerful influence. His writings are partly autobiographical, partly polemical, homiletic, or exegetical.

Au'gustine (or Austin, St.), the Apostle of the English, flourished at the close of the sixth century, was sent with forty monks by Pope Gregory I to introduce Christianity into Saxon England, and was kindly received by Ethelbert, king of Kent, whom he converted, baptizing 10,000 of his subjects in one day. In acknowledgment of his tact and success Augustine received the archiepiscopal pall from the pope. with instructions to establish twelve sees in his province, but he could not persuade the British bishops in Wales to unite with the new

English Church. He d. in 604 or 605. Augus'tulus, ROMULUS, the last of the Western Roman emperors; reigned for one year (475-76), when he was overthrown by Odoacer and banished.

Augus'tus, CAIUS JULIUS CÆSAR OCTAVI-ANUS, originally called Caius Octavius, Roman emperor, was the son of Caius Octavius and Atia, a daughter of Julia, the sister of Julius Cæsar. He was b. 63 B. c., and d. A. D. 14. He returned to Rome to claim Cæsar's property and avenge his death, and now took, according to usage, his uncle's name with the surname Octavianus. He got himself chosen consul in 43. Soon after the first triumvirate was formed between him and Antony and Lepidus, and this was followed by the conscription and assassination of 300 senators and 2,000 knights of the party opposed to the triumvirate. Next year Octavianus and Antony defeated the republican army under Brutus and Cassius at Philippi. The victors now divided the Roman world between them. Octavianus getting the West, Antony the East, and Lepidus Africa. Sextus Pompeius, who had made himself formidable at sea, had now to be put down; and Lepidus, who had hitherto retained an appearance of power, was deprived of all authority (B. c. 36) and retired into private life. Antony and Octavianus now shared the empire between them; but while the former, in the East, gave himself up to a life of luxury, and alienated the Romans by his alliance with Cleopatra and his adoption of Oriental manners, Octavianus skillfully cultivated popularity, and soon declared war ostensibly against the queen of Egypt. The naval victory of Actium, in which the fleet of Antony and Cleopatra was defeated,

made Octavianus master of the world, B. c. 31. He returned to Rome B. c. 29, celebrated a splendid triumph, and caused the Temple of Janus to be closed in token of peace being restored. Gradually all the highest offices of state, civil and religious, were united in his hands, and the new title of Augustus was also assumed by him, being formally conferred by the senate in B. c. 27. Under him successful wars were carried on in Africa and Asia (against the Parthians), in Gaul and Spain, in Pannonia, Dalmatia, etc.; but the defeat of Varus by the Germans under Arminius with the loss of 3 legions, A. D. 9, was a great blow to him in his old age. He adorned Rome in such a manner that it was said, "He found it of brick, and left it of marble." The people erected altars to him, and, by a decree of the senate, the month Sextilis was called Augustus (our August). Vergil and Horace were befriended by him, and their works and those of their contemporaries are the glory of the Augustan Age. His death, which took place at Nola, plunged the empire into the greatest grief. He was thrice married, but had no son, and was succeeded by his stepson Tiberius, whose mother, Livia, he had married after prevailing on her husband to divorce her.

Augustus II (1670-1733) (or FREDERICK-AUGUSTUS I), elector of Saxony and king of Poland, second son of John George III, elector of Saxony, b. at Dresden, d. at Warsaw, Poland. He succeeded his brother in the electorate in 1694, and the Polish throne having become vacant, in 1696, by the death of John Sobleski, Augustus presented himself as a candidate for it and was successful. He joined with Peter the Great in the war against Charles XII of Sweden. In 1704 he was deposed, and two years later formally resigned the crown to Stanislaus I. In 1709, after the defeat of Charles at Pultowa, the Poles recalled Augustus, who united himself anew with Peter. The death of Charles XII put an end to the war, and Augustus concluded a peace with Sweden. Augustus now gave himself wholly up to voluptuousness and a life of pleasure. The Poles yielded but too readily to the example of their king, and the last years of his reign were characterized by boundless luxury and corruption of manners. The Countess of Königsmark bore him the celebrated commander Marshal Saxe (Maurice of Saxony).

Augustus III (1606–1763) (or FREDERICK-AUGUSTUS II), elector of Saxony and king of Poland, son of Augustus II, b. at Dresden, succeeded his father as elector in 1733, and was chosen king of Poland through the influence of Austria and Russia. He distinguished himself by the splendor of his feasts and the extravagance of his court. During the first Silesian war he formed a secret alliance with Austria. The consequence was that during the second Silesian war Frederick the Great of Prussia pushed on into Saxony, and occupied the capital, from which Augustus fied. By the peace of Dresden, 1745, he was reinstated in the possession of Saxony. In 1756 he was involved anew in a war against Prussia. When Frederick declined his proposal of neutrality he left Dresden, and entered the camp at Pirna, where 17,000 Saxon troops were assembled. Frederick surrounded the Saxons, who were obliged to surrender, and Augustus fied to Poland. On the threat of invasion by Russia he returned to Dresden, where he died. His son, Frederick Christian, succeeded him as elector of Saxony, and Stanislaus Poniatowski as king of Poland.

Auk, a name of certain swimming birds, . including the great auk, the little auk, the puffin, etc. The genus auks proper, contains only two species, the great auk and the razor-bill. The great auk or gair-fowl, a bird about 3 feet in length, used to be plentiful in northerly regions, and also visited the British shores, but has become extinct. Some seventy skins, about as many eggs, with bones representing perhaps a hundred individuals, are preserved in various museums. Though the largest species of the family, the wings were only  $\theta$  inches from the carpal joint to the tip, totally useless for flight, but employed as fins in swimming, especially under water. The tail was about 3 inches long; the beak was high, short, and compressed; the head, neck under each eye, and most of the under parts white. Its legs were placed so far back as to cause it to sit nearly upright. The razor-bill is about 15 inches in length, and its wings are sufficiently developed to be used for flight. Thousands of these birds are killed on the coast of Labrador for their breast feathers which are warm and elastic.

Aulic, in the old German Empire, one of the two supreme courts of the German Empire, the other being the court of the imperial chamber. It had not only concurrent jurisdiction with the latter court, but in many cases exclusive jurisdiction, in all feudal processes and in criminal affairs, over the immediate feudatories of the emperor and in affairs which concerned the imperial government. The title is now applied in Germany in a general sense to the chief council of any department,—political, administrative, judicial, or military.

Au'lis, in ancient Greece, a seaport in Bœotia, on the strait called Euripus, between Bœotia and Eubœa. See *Iphigenia*.

Bectia and Eubeea. See Iphigenia. Aumale (ô-mäl), a small French town, department of Seine Inférieure, 35 mi. n.e. of Rouen, which has given titles to several notables in French history. JEAN D'ARCOURT, eighth COUNT D'AUMALE, fought at Agincourt, and defeated the English at Gravelle (1423). CLAUDE II, DUC D'AUMALE, one of the chief instigators of the Massacre of St. Bartholomew, was killed 1573. CHARLES DE LORRAINE, DUC D'AUMALE, was an ardent partizan of the League in the politico-religious French wars of the sixteenth century. HENRI-EUGENE-PHILIPPE LOUIS D'ORLEANS, DUC D'AUMALE, son of Louis Philippe, king of the French, b. in 1822. In 1847 he succeeded Marshal Bugeaud as governor general of Algeria, where he had distinguished himself in the war against Abd-el-Kader. After the revolution of 1848 he retired to England; but he returned to France in 1871, and was elected a member of the assembly; became inspector-general of the army in 1879, and was expelled along with the other royal princes in 1886. He is author of a *History of the House of Condé*, several pamphlets, etc.

Aurangabad', a town of India, in the territory of the Nizam of Haidarabad, 175 mi. from Bombay. It contains a ruined palace of Aurengzebe and a mausoleum erected to the memory of his favorite wife. It was formerly a considerable trading center, but its commercial importance decreased when Haidarabad became the capital of the Nizam. Pop. 20,-500.

Aure'lian, LUCIUS DOMITIUS AURELIANUS (212-275), emperor of Rome, of humble origin, rose to the highest rank in the army, and on the death of Claudius II (270) was chosen emperor. He delivered Italy from the barbarians, and conquered the famous Zenobia, queen of Palmyra. He followed up his victories by the reformation of abuses, and the restoration throughout the empire of order and regularity. He lost his life by assassination, when heading an expedition against the Persians.

Aure' ilus Antoni' nus, MARCUS(121-180 A.D.), often called simply Marcus Aurelius, Roman emperor and philosopher, son-in-law, adopted son, and successor of Antoninus Pius, succeeded to the throne 161. Brought up and instructed by Plutarch's nephew, Sextus, the orator Herodes Atticus, and L. Volusius Mecianus, the jurist, he had become acquainted with learned men, and formed a particular love for the Stoic philosophy. A war with Parthia broke out in the year of his accession, and did not terminate till 166. In 169 Verus died, and the sole command of the war devolved on Marcus Aurelius, who prosecuted it with the utmost rigor, and nearly exterminated the Marcomanni. After this victory the Marcomanni, the Quadi, as well as the rest of the barbarians, sued for peace. The sedition of the Syrian governor Avidius Cassius, with whom Faustina, the empress, was in treasonable communication, called off the emperor from his conquests, but before he reached Asia the rebel was assassinated. Aurelius returned to Rome, after visiting Egypt and Greece, but soon new incursions of the Marcomanni compelled him once more to take the field. He defeated the enemy several times, but was taken sick at Sirmium, and d. at Vindobona (Vienna). His only extant work is the Meditations, written in Greek, and which has been translated into most modern lan-Aurelius was one of the best emguages. perors ever Rome saw, although his philosophy and the magnanimity of his character did not restrain him from the persecution of the Christians, whose religious doctrines he was led to believe were subversive of good government.

Au'rengzebe (-zeb) ("ornament of the

throne"), one of the greatest of the Mogul emperors of Hindustan, b. in October, 1618 or 1619. In his twentieth year he raised a body of troops by his address and good fortune, and obtained the government of the Deccan. He murdered his relatives one after the other, and in 1659 ascended the throne. Two of his sons, who endeavored to form a party in their own favor, he caused to be arrested and put to death by slow poison. He conquered Golconda and Bijapur, and drove out, by degrees, the Mahrattas from their country. After his death the Mogul Empire declined.

Auriliac ( $\bar{v}$ -rē-yāk), a town of France, capital of the dep. Cantal, in a valley watered by the Jordanne, about 270 mi. s. of Paris, well built, with wide streets; copper works, paper works, manufactures of lace, tapestry, leather, etc. Pop. 13,727.

**Aurochs** (g'roks), a species of wild bull or buffalo, the *urus* of Cæsar, *bison* of Pliny, the European bison, *Bos* or *Bonassus Bison* of modern naturalists. This animal was once abundant in Europe, but were it not for the protection afforded by the emperor of Russia to a few herds which inhabit the forests of Lithuania it would soon be extinct.

Auro'ra, in classical mythology, the goddess of the dawn, daughter of Hyperion and Theia, and sister of Helios and Selēnē(Sun and Moon). She was represented as a charming figure, "rosy-fingered," clad in a yellow robe, rising at dawn from the ocean and driving her chariot through the heavens. Among the mortals whose beauty captivated the goddess, poets mention Orion, Tithônus, and Cephălus.

Aurora, Kane co., Ill., on Fox River, 38 mi. w. of Chicago. Railroads: C., B. & Q.; C. & N. W.; and E. J. & E. R. R. Industries: railroad shops, one flouring mill, five iron foundries, one cotton mill, stove works, two corset factories, and one carriage factory. Surrounding country agricultural. The settlement was first known as McCarty's Mills, the name "Aurora" being adopted late in 1837. A post-office was first established in 1837, with Burr Winton as postmaster. The first church organization was the M. E. in 1837. First school taught in spring of 1836, and first bridge built the same year. Aurora Beacon, established in 1846, and still flourishing, oldest paper in this section. The site of Aurora was once included in an Indian reservation. When Joseph McCarty arrived in April, 1834, he found a large Pottawatomie village on the west bank of the river, the head of the tribe being the noted chief Waubonsie. The first physician, Dr. Daniel Eastman, came in 1835. Joseph G. Stolp, still a resident, settled in 1837, and that fall built a wool-carding shop. He became a heavy manufacturer of woolen goods, continuing until 1886. Aurora became a city in 1857. Pop. est. 1897, 25,000.

Auro'ra Borea'ils, a luminous meteoric phenomenon appearing in the north, most frequently in high latitudes, the corresponding phenomenon in the southern hemisphere being called Aurora Australis, and both being also called Polar Light, Streamers, etc. The northern aurora has been far the most observed and studied. It usually manifests itself by streams of light ascending toward the zenith from a dusky line of cloud or haze a few degrees above the horizon, and stretching from the north toward the west and east, so as to form an arc with its ends on the horizon, and its different parts and rays are constantly in motion. Sometimes it appears in detached places; at other times it almost covers the whole sky. It assumes many shapes and a variety of colors, from a pale red or yellow to a deep red or blood color; and in the northern latitudes serves to illuminate the earth and cheer the gloom of the long winter nights. The appearance of the aurora borealis so exactly resembles the effects of artificial electricity that there is every reason to believe that their causes are identical. When electricity passes through rarefied air it exhibits a diffused luminous stream which has all the characteristic appearances of the aurora, and hence it is highly probable that this natural phenomenon is occasioned by the passage of electricity through the upper regions of the atmosphere. The influence of the aurora upon the magnetic needle is now considered as an ascertained fact, and the connection between it and magnetism is further evident from the fact that the beams or coruscations issuing from a point in the horizon west of north are frequently observed to run in the magnetic meridian. What are known as magnetic storms are invariably connected with exhibitions of the aurora, and with spontaneous galvanic currents in the ordinary telegraph wires; and this connection is found to be so certain that, upon remarking the display of one of the three classes of phenomena, we can at once assert that the other two are also observable. The aurora borealis is said to be frequently accompanied by sound, which is variously described as resembling the rustling of pieces of silk against each other, or the sound of wind against the flame of a candle. The aurora of the southern hemisphere is quite a similar phenomenon to that of the north.

Ausculta' tion, a method of distinguishing the state of the internal parts of the body, particularly of the thorax and abdomen, by observing the sounds arising in the part, either through the immediate application of the ear to its surface, or by applying the stethoscope to the part, and listening through it. Auscultation may be used with more or less advantage in all cases where morbid sounds are produced, but its general applications are: the auscultation of respiration; the auscultation of the voice; auscultation of coughs; auscultation of sounds foreign to all these, but sometimes accompanying them; auscultation of the actions of the heart; obstetric auscultation. The parts when struck also give different sounds in health and disease.

Aus' pices, among the ancient Romans were strictly omens or auguries derived from birds, though the term was also used in a wider sense. Nothing of importance was done without taking the auspices, which, however, simply showed whether the enterprise was likely to result successfully or not, without supplying any further information. Magistrates possessed the right of taking the auspices, in which they were usually assisted by an augur. Before a war or campaign a Roman general always took the auspices, and hence the operations were said to be carried out "under his auspices." See Augurs.

Aus'sig, a town in Bohemia, near the junction of the Bila with the Elbe, 42 mi. n.n.w. of Prague; has large manufactures of woolens, chemicals, etc. Pop. 16,524.

Aus'ten, JANE (1775-1817), English novelist. Her principal novels are, Sense and Sensibility; Pride and Prejudice; Mansfield Park; Emma; Northanger Abbey; and Persuasion. Her novels are marked by ease, nature, and a complete knowledge of the domestic life of the English middle classes of her time.

Aus' terlitz, a town with 3,452 inhabitants, in Moravia, 10 mi. e. of Brünn, famous for the battle of Dec. 2, 1805, fought between the French (70,000 in number) and the allied Austrian and Russian armies (95,000). The decisive victory of the French led to the Peace of Pressburg between France and Austria.

Pressburg between France and Austria. Aus'tin, capital of the state of Texas. There is a state university and other institutions, and a splendid capitol built of red granite. Pop. 15,400.

Austin, JOHN (1790-1859), an English writer on jurisprudence. From 1826 to 1835 he filled the chair of jurisprudence at London University. His fame rests solely on his great works: The Province of Jurisprudence Determined (1832), and Lectures on Jurisprudence (1861-63).

Australasia, a division of the globe usually regarded as comprehending the islands of Australia, Tasmania, New Zealand, New Caledonia, the New Hebrides, the Solomon Islands, New Ireland, New Britain, the Admiralty Islands, New Guinea, and the Arru Islands, besides numerous other islands and island groups. Area 3,239,199 sq. mi.; pop. 1891, 4,285,297. It forms one of three portions into which some geographers have divided Oceania, the other two being Malaysia and Polynesia.

Australia (old-name, New Holland), the largest island in the world, a seagirt continent, lying between the Indian and Pacific oceans, s.e. of Asia. It is separated from New Guinea on the north by Torres Strait, from Tasmania on the south by Bass Strait. It is divided into two unequal parts by the





TYPES OF AUSTRALIAN RACES. I. Fiji Islanders. 2. Tasmanians. 3. South Anstralians. 4. Maori (New Follow). 5. New Britons. 6. Samon Islanders. 7. Natives of New Ireland (Buk Islands). 8. Carolina Islanders Paraget). 9. Admiralty Islanders. 10. Tonga Islanders. 11. Natives of New Ireland. 12. Woman of Samon Island, Paraget. 13. 14. Marshal Islanders, Man and Wife (Jaluit). Digitized by GOOS
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#### Australia

Tropic of Capricorn, and consequently belongs partly to the South Temperate, partly to the Torrid Zone. It is occupied by five British colonies; namely, New South Wales, Victoria, and Queensland in the east; South Australia in the middle, stretching from sea to sea; and Western Australia in the west. Their area and pop. are as follows (but authorities differ as to the areas):---

,	Area in	
	sq. mi.	Pop.
New South Wales	310,700	1,134,207
Queensland	668.497	398,718
Western Australia	1,060,000	49,782
	8,030,771	3,033,166

Sydney, the capital of N. S. Wales; Melbourne, the capital of Victoria; Adelaide, the capital of S. Australia; and Brisbane, the capital of Queensland, are the chief towns.

Although there are numerous spacious harbors on the coasts, there are few remarkable indentations; the principal being the Gulf of Carpentaria on the n., the Great Australian Bight, and Spencer's Gulf, on the s. The chief projections are Cape York Peninsula and Arnhem Land in the n. Parallel to the n.e. coast runs the Great Barrier Reef for 1,000 miles. In great part the e. coast is bold and rocky, and is fringed with many small islands. Part of the s. coast is low and sandy, and part presents cliffs several hundred feet high. The n. and w. coasts are generally low, with some elevations at intervals.

The interior, so far as explored, is largely composed of rocky tracts and barren plains with little or no water. The whole continent forms an immense plateau, highest in the east, low in the center, and with a narrow tract of land usually intervening between the elevated area and the sea. The base of the table-land is granite, which forms the surface-rock in a great part of the southwest, and is common in the higher grounds along the east side. Secondary (cretaceous) and tertiary rocks are largely developed in the interior. Silurian rocks occupy a large area in South Australia, on both sides of Spencer Gulf. The mountainous region in the southeast and east is mainly composed of volcanic, silurian, carbonaceous, and carboniferous rocks yielding good coal. No active volcano is known to exist, but in the southeast there are some craters only recently extinct. The highest and most extensive extinct. mountain system is a belt about 150 mi. wide skirting the whole eastern and southeastern border of the continent, and often called in whole or in part the Great Dividing Range, from forming the great watershed of Australia. A part of it, called the Australian Alps, in the southeast, contains the highest summits in Australia: Mount Kosciusko (7,175 ft.), Mount Clarke (7,256), and Mount Townshend (7,353). West of the Dividing Range are extensive plains or downs admirably adapted for pastoral purposes. The deserts and scrubs, which occupy large areas of the interior, are a characteristic feature of Australia. The former are destitute of vegetation, or are clothed only with a coarse spiny grass that affords no sustenance to cattle or horses; the latter are composed of a dense growth of shrubs and low trees, often impenetrable till the traveler has cleared a track with his ax.

The rivers of Australia are nearly all subject to great irregularities in volume, many of them at one time showing a channel in which there is merely a series of pools, while at another they inundate the whole adjacent country. The chief is the Murray, which, with its affluents, the Murrumbidgee, Lachlan, and Darling, drains a great part of the interior west of the Dividing Range, and falls into the sea on the south coast (after entering Lake Alexandrina). Its greatest tributary is the Darling, which may even be regarded as the main stream. On the east coast are the Hunter, Clarence, Brisbane, Fitzroy, and Burdekin; on the west, the Swan, Murchison, Gascoyne, Ashburton, and De Grey; on the north, the Fitzroy, Victoria, Flinders, and Mitchell. The Australian rivers are of little service in facili-Many of tating internal communication. them lose themselves in swamps or sandy wastes of the interior. A considerable river of the interior is Cooper's Creek, or the Barcoo, which falls into Lake Eyre, one of a group of lakes on the south side of the continent having no outlet, and accordingly salt. The principal of these are Lakes Eyre, Torrens, and Gairdner, all of which vary in size and saltness according to the season. Another large salt lake of little depth, Lake Amadeus, lies a little west of the center of Australia. Various others of less magnitude are scattered over the interior.

The climate of Australia is generally hot and dry, but very healthy. In the tropical portions there are heavy rains, and in most of the coast districts there is a sufficiency of moisture, but in the interior the heat and drought are extreme. Considerable portions now devoted to pasturage are liable at times to suffer from drought. At Melbourne the mean temperature is about  $56^{\circ}$ , at Sydney about  $63^{\circ}$ . The southeastern settled districts are at times subject to excessively hot winds from the interior, which cause great discomfort, and are often followed by a violent cold wind from the south ("southerly bursters"). In the mountainous and more temperate parts snow-storms are common in winter (June, July, and August).

Australia is a region containing a vast quantity of mineral wealth. Foremost come its rich and extensive deposits of gold, which, since the precious metal was first discovered in 1851, have produced a total of more than \$1,350,000,000. The greatest quantity has been obtained in Victoria, but New South Wales and Queensland have also yielded a considerable amount. Probably there are rich stores of gold as yet undiscovered. Australia also possesses silver, copper, tin, lead, zinc, antimony, mercury, plumbago, etc., in abundance, besides coal (now worked to a considerable extent in New South Wales) and iron. Various precious stones are found, as the garnet, ruby, topaz, sapphire, and even the diamond. Of building stone there are granite, limestone, marble, and sandstone.

The Australian flora presents peculiarities which mark it off by itself in a very decided manner. Many of its most striking features have an unmistakable relation to the general dryness of the climate. The trees and bushes have for the most part a scanty foliage, presenting little surface for evaporation, or thick leathery leaves well fitted to retain moisture. The most widely spread types of Australian vegetation are the various kinds of gum-tree, the shea-oak, the acacia or wattle, the grass-tree, many varieties of Proteaceæ, and a great number of ferns and tree ferns. Of the gum tree there are found upward of 150 species, many of which are of great value. Individual specimens of the "peppermint" have been found to measure from 480 to 500 ft. in height. As timber trees the most valuable members of this genus are the red-gum, the timber of which is hard, dense, and almost indestructible. A number of the gum-trees have deciduous bark. The wattle or acacia includes about 300 species, some of them of considerable economic value, yielding good timber or bark for tanning. The most beautiful and most useful is that known as the golden wattle, which in spring is adorned with rich masses of fragrant yellow blossom. Palms -of which there are 24 species, all except the cocoa palm peculiar to Australia-are confined to the n. and e. coasts. In the "scrubs' already mentioned hosts of densely inter-twisted bushes occupy extensive areas. The mallee scrub is formed by a species of dwarf eucalyptus, the mulga scrub by a species of thorny acacia. A plant which covers large areas in the arid regions is the spinifex or porcupine grass, a hard, coarse, and excessively spiny plant, which renders traveling difficult, wounds the feet of horses, and is utterly uneatable by any animal. Other large tracts are occupied by herbs or bushes of a more valuable kind, from their affording fodder. Foremost among those stands the salt-bush. Beautiful flowering plants are numerous. Australia also possesses great numbers of turf-forming grasses, such as the kangaroo-grass, which survives even a tolerably protracted drought. The native fruit-trees are few and unimportant, and the same may be said of the plants yielding roots used as food; but exotic fruits and vegetables may now be had in the different colonies in great abundance and of excellent quality. The vine, the olive, and mulberry thrive well, and quantities of wine are now produced. The cereals of Europe and maize are extensively cultivated, and large tracts of country, particularly in Queensland, are under the sugar-cane.

The Australian fauna is almost unique in its character. Its great feature is the nearly total absence of all the forms of mammalia which abound in the rest of the world, their place being supplied by a great variety of marsupials —these animals being nowhere else found, ex-

cept in the opossums of America. There are about 110 kinds of marsupials (of which the kangaroo, wombat, bandicoot, and phalangers or opossums, are the best known varieties), over 20 kinds of bats, a wild dog (the dingo), and a number of rats and mice. Two extraordinary animals, the platypus, or water-mole of the colonist (Ornithorhynchus), and the porcupine ant-eater (Echidna) constitute the lowest order of mammals (Monotremata), and are confined to Australia. Their young are produced from eggs. Australia now possesses a large stock of the domestic animals of Britain, which thrive there remarkably well. The breed of horses is excellent. Horned cattle and sheep are largely bred, the first attaining a great size, while the sheep improve in fleece and their flesh in flavor. There are upward of 650 different species of birds, the largest being the emu, or Australian ostrich, and a species of cassowary. Peculiar to the country are the black swan, the honcy-sucker, the lyre bird, the brush turkey, and other moundbuilding birds, the bower birds, etc. The parrot tribe preponderate over most other groups of birds in the continent. There are many reptiles, the largest being the alligator, There found in some of the northern rivers. are upward of 60 different species of snakes, some of which are very venomous. Lizards, frogs, and insects are also numerous in various parts. The seas, rivers, and lagoons abound in fish of numerous varieties, and other aquatic animals, many of them peculiar. Whales and seals frequent the coasts. On the n. coasts are extensive fisheries of trepang, much visited by native traders from the Indian Archipelago. Some animals of European origin, such as the rabbit and the sparrow, have developed into real pests in several of the colonies.

The natives belong to the Australian negro stock, and are sometimes considered the lowest as regards intelligence in the whole human family, though this is doubtful. At the census of 1881 they were believed to number about 31,700, exclusive of those in the unexplored parts. They are of a dark-brown or black color, with jet-black curly but not woolly hair, of medium size, but inferior muscular development. In the settled parts of the continent they are inoffensive, and rapidly dying out. They have no fixed habitations; in the summer they live almost entirely in the open air, and in the more inclement weather they shelter themselves with bark erections of the rudest con-struction. They have no cultivation and no domestic animals. Their food consists of such animals as they can kill, and no kind of living creature seems to be rejected-snakes, lizards, frogs, and even insects being eaten, often half raw. They are ignorant of the potter's art. In their natural condition they wear little or no clothing. They speak a number of different languages or dialects. The women are re-garded merely as slaves, and are frightfully maltreated. They have no religion; they practise polygamy, and are said to sometimes resort to cannibalism, but only in exceptional circumstances. They are occasionally em-





ployed by the settlers in light kinds of work, and as horse-breakers; but they dislike continuous occupation, and soon give it up. The weapons of all the tribes are generally similar, consisting of spears, shields, boomerangs, wooden axes, clubs, and stone hatchets. Of these the boomerang is the most singular, being an invention confined to the Australians.

Each of the colonies is quite independent of the others, having a governor, administration, and (except Western Australia) a parliament of its own. The governors are appointed by the queen, and all acts passed by the colonial legislatures must receive the royal assent. Each parliament consists of two houses corresponding to the British House of Lords and House of Commons, the lower house being elected by manhood suffrage. Each governor is assisted by a ministry, and the machinery of government resembles that of the home country. The aggregate annual revenue of the colonies is about \$100,000,000, the annual expenditure several millions more. The public debt is over \$500,000,000. The colonies have a considerable defensive force of militia and volunteers, also a number of gunboats, torpedo-boats, etc., besides which there is always a squadron of British men-of-war on the Australian station. It is probable that in time the colonies may be united into one dominion as has been the case in Canada. In 1885 a measure was passed by the imperial parliament to enable the whole of the Australasian colonies to federate. So far the colonies of Victoria, Queensland, Tasmania, Western Australia, and Fiji have taken advantage of the act, and the first meeting of the Federal Council took place in January, 1886. There is no established church in any of the colonies. The denomination which numbers most adherents is the English (or Anglican) Church, next to which come the Roman Catholics, Presbyterians, and Methodists. Education is well provided for, instruction in the primary schools being in some cases free and compulsory, and the higher education being more and more attended to. There are flourishing universities in Melbourne, Sydney, and Adelaide. Newspapers are exceedingly numerous, and period-icals of all kinds are abundant. There is as yet no native literature of any distinctive type, but names of Australian writers of ability both in prose and poetry are beginning to be known beyond their own country.

Pastoral and agricultural pursuits and mining are the chief occupations of the people, though manufactures and handicrafts also employ large numbers. For sheep-rearing and the growth of wool the Australian colonies are unrivalled, and while the production of gold has considerably decreased that of wool is constantly on the increase. The great bulk of the wool exported goes to Britain, which in the last two or three years has received over 300,000,000 lbs. from the Australian colonies annually. The commerce is rapidly extending, and becoming every year more important to Britain, whence the colonists derive their chief supplies of manufactured

goods in return for wool, gold, and other produce. Next to wool come gold, tin, copper, wheat, preserved meat, and tallow, hides and skins, cotton, tobacco, sugar, and wine as the most important items of export. The chief imports consist of textile fabrics, haberdashery and clothing, machinery and metal goods. There are upward of 7,000 miles of railway in actual use or in course of construction, and about 34,000 miles of telegraph. The longest telegraph line is that running northward across the continent from Adelaide. The two chief routes for mails between Britain and the Australian colonies are by way of the Suez Canal. and by San Francisco across the American continent. The coinage is the same as in the mother country. Banks and banking offices are numerous, including post-office or other savings banks for the reception of small sums.

It is doubtful when Australia was first discovered by Europeans. Between 1531 and 1542 the Portuguese published the existence of a land which they called Great Java, and which corresponded to Australia, and probably the first discovery of the country was made by them early in the sixteenth century. The first authenticated discovery is said to have been made in 1601, by a Portuguese named Manoel Godinho de Eredia. In 1606 Torres, a Spaniard, passed through the strait that now bears his name, between New Guinea and Between this period and 1628 a Australia. large portion of the coast line of Australia had been surveyed by various Dutch navigators. In 1664 the continent was named New Holland by the Dutch government. In 1688 Dampier coasted along part of Australia, and about 1700 explored a part of the w. and n. w. coasts. In 1770 Cook carefully surveyed the e. coast, named a number of localities, and took possession of the country for Britain. He was followed by Bligh in 1789, who carried on a series of observations on the n.e. coast, adding largely to the knowledge already obtained of this new world. Colonists had now arrived on the soil, and a penal settlement was formed (1788) at Port Jackson. In this way was laid the foundation of the future colony of New South Wales. The Moreton Bay district (Queensland) was settled in 1825; in 1835 the Port Philip district. In 1851 the latter district was erected into a separate colony under the name of Victoria. Previous to this time the colonies both of Western Australia and of South Australia had been founded—the former in 1829, the latter in 1836, The latest of the colonies is Queensland, which only took an independent existence in 1859. The discovery of gold in abundance took place in 1851, and caused an immense excitement and great influx of immigrants. The population was then only about 350,000, and was slowly increasing; but the discovery of the precious metal started the country on that career of prosperity which has since been almost uninterrupted. Convicts were long sent to Australia from the mother country, but transportation to New South Wales practically ceased in

## Austria

1840, and the last convict vessel to West Australia arrived in 1868. Altogether about 70,000 convicts were landed in Australia (besides almost as many in Tasmania).

The record of interior exploration forms an interesting part of Australian history. This has been going on since early in the century, and is yet far from complete. There is still a large area of the continent of which little or nothing is known, comprising especially a vast territory belonging to Western Australia, and a portion of South Australia. Among the men who have won fame in the field of Australian exploration are Oxley (1817-23), who partly explored the Lachlan and Macquarie, discovered the Brisbane, etc.; Hume and Hovell (1824), who crossed what is now the colony of Victoria from north to south; Cunningham (1827), who discovered the Darling Downs; Sturt (1828-29), who examined the Macquarie, part of Darling, and the Murrumbidgee, which he traced to the Murray, sailing down the latter to Lake Alexandrina, in 1814 penetrating to near the middle of the continent from the south; Mitchell (1831-36) made extensive explorations in N. S. Wales and Victoria; M'Millan (1839) explored and traversed Gippsland; Eyre (1840) traveled by the coast from Adelaide to King George's Sound; Leichhardt in 1844-45 traveled from Brisbane to Port Essington, discovering fine tracts of territory and the numerous rivers flowing into the Gulf of Carpentaria; in 1848 he was lost in the northern interior, in attempting to cross Australia from east to west, and nothing further regarding his fate has been discovered; Kennedy (1848) was killed in exploring Cape York Peninsula; A. C. Gregory (1855-56) explored part of northwestern Australia, and crossed from that to the Brisbane district, an important exploring journey; M'Douall Stuart (1859-60-62) crossed the continent from south to north and back again nearly in the line of the present overland telegraph; Burke, Wills, Gray, and King (1860-61) crossed from Melbourne to the Gulf of Carpentaria, but Burke, Wills, and Gray perished on the return journey; F. T. Gregory (1861) ex-plored the region of the Ashburton, Fortesque, and other rivers of n. w. Australia; Warburton (1873) traveled with camels from the center of the continent to the n. w. coast; J. Forrest (1874) made an important journey in Western Australia: Giles (1874-76) explored central Western Australia; Favenc (1878-79) traveled from Brisbane to Port Darwin; A. Forrest (1879) explored part of northern Australia; Mills (1883) traversed with camels a considerable stretch of new ground in Western Australia; Winnicke (1883-84), also with camels, explored and mapped about 40,000 sq. mi. of the unknown interior; Lindsay (1885-86) traveled n. w. from Lake Eyre, and then n. w. to the Gulf of Carpentaria. He had hoped to find traces of Leichhardt, but was unsuccessful. Various subsequent explorations have also been made.

Austria (that is, Eastern Empire, or Austria-Hungary), an extensive duplex monarchy in

Central Europe, inhabited by several distinct nationalities, and consisting of two semi-independent countries, each with its own parliament and government, but with one common sovereign, army, and system of diplomacy, and also with a common parliament. The Austrian Empire now has a total area of about 240,-000 sq. mi., and is bounded s. by Turkey, the Adriatic, and Italy; w. by Switzerland, Bavaria, and Saxony; n. by Prussia and Russian Poland; and e. by Russia and Roumania. On the shores of the Adriatic, along the coasts of Dalmatia, Croatia, Istria, etc., lies its only sea frontage, which is of comparatively insignificant extent. Besides the two great divisions of Austria proper, or "Cisleithan" Austria and Hungary or "Transleithan" Austria, the Aus-tro-Hungarian monarchy is divided into a number of governments or provinces, as follows :-

AUSTRIAN PROVINCES.—Lower Austria, Upper Austria, Salzburg, Styria, Carinthia, Carniola, Trieste, Görz, Gradiska, Istria, Tyrol, Vorarlberg, Bohemia, Moravia, Silesia, Galicia, Bukowina, and Dalmatia.

HUNGARIAN PROVINCES.—Hungary, Transylvania, Croatia, Slavonia, and Fiume.

The est. pop. in 1890 was 40,464,808. The largest cities are Vienna, Budapest, Prague, Lemberg, Gratz, Brunn, Szegedin, Trieste. Cracow. Bosnia, and Herzegovina, formerly Turkish, but now under the administration of Austria, have an area of 19,728 sq. mi.; pop. 1,336,091.

The prevailing character of the Austrian dominions is mountainous or hilly, the plains not occupying more than a fifth part of the whole surface. The loftiest ranges belong to the Alps, and are found in Tyrol, Styria, Salzburg. and Carinthia, the highest summits being the Ortlerspitzen (12.814 ft.) on the western boundary of Tyrol, and the Grosslockner (12,300) on the borders of Salzburg, Tyrol, and Carinthia. Another great range is that of the Carpathians, bounding Hungary on the north. The most extensive tracts of low or flat land, much of which is very fertile, occur in Hungary, Galicia, and Slavonia, the great Hungarian plain having an area of 36,000 sq. mi. They stretch along the courses of the rivers, of which the chief are the Danube, with its tributaries (the Save, the Drave, the Theiss, the Maros, the Waag, the March, the Raab. the Inn); also the Elbe and Moldau and the Dniester. The Danube for upward of 800 mi. is navigable for pretty large vessels; the tributaries also are largely navigable. The lakes are numerous and often picturesque, the chief be-ing Lake Balaton or the Plattensee. The climate is exceedingly varied, but generally good. The principal products of the north are wheat, barley, oats, and rye; in the center vines and maize are added; and in the south olives and various fruits. The cereals grow to perfection, Hungarian wheat and flour being celebrated. Other crops are hops, tobacco. flax, and hemp. Wine is largely made, but the wines are inferior on the whole, with ex-

ception of a few kinds, including Tokay. The forests cover 70,000 sq. mi., or one third of the productive soil of the empire. Sheep and cattle are largely reared. Wild deer, wild swine, chamois, foxes, lynxes, and a species of small black bear are found in many districts, the fox and lynx being particularly abundant. Herds of a small native breed of horses roam wild over the plains of Hungary. In mineral productions Austria is very rich, possessing, with the exception of platinum, all the useful metals, the total annual value of the mineral products of the Austrian Empire being estimated at upward of \$60,000,000, the principal being coal, salt, and iron.

Manufactures are in the most flourishing condition in Bohemia, Moravia, Silesia, and Lower Austria; less so in the eastern provinces, and insignificant in Dalmatia, Buko-wina, Herzegovina, etc. Among the enost important manufactures are those of machinery and metal goods, Austria holding a high place for the manufacture of musical and scientific instruments, gold and silver plate, and jewelry; of stone and china-ware, and of glass, which is one of the oldest and most highly developed industries in Austria; of chemicals; of sugar from beet; of beer, spirits, etc., and especially the manufactures of woolen, cotton, hemp, and fiax. The manufacture of tobacco is in a state monopoly. Tanning is carried on to a great extent, and in the production of gloves (in Vienna and Prague), Austria stands next to France.

In addition to the general import and export trade Austria carries on a very con-siderable amount of business in the transit of goods through her territory. In 1889 the total value of imports into Austria-Hungary was 589,000,000 florins; of exports, 766,000,000 florins; the value of imports in 1890, 610,000,000 florins; exports, 771,-000,000 florins. Among imports are cotton and other fibers, textile goods and yarn, metals, machinery, drugs, chemicals, oils, fats, hides, skins, etc. The chief exports are cereals, animals, metallic goods, woven fabrics, pottery, and glass manufactures. Nearly two thirds of the commerce is with Germany, next in importance being the trade with Roumania, Italy, and Russia. The exports direct to the United Kingdom in 1890 were \$8,641,685; the imports of British produce thence, \$6,416,045; these mounts do not include indirect experts and amounts do not include indirect exports and imports through other countries. The staple export to the United Kingdom is corn and The chief imports from it are cotfiour. ton manufactures, machinery, and metals, woolen goods, fish, etc. The mercantile woolen goods, fish, etc. The mercantile navy of Austria has a total burden of about 325,000 tons. The principal ports are Trieste, Pola. and Fiume. There are about 14,000 miles of railway open. Accounts are kept in gulden or florins of 100 kreutzers each, the florin being nominally=fifty cents. Practically the chief medium of exchange is banknotes. The Austrian centner or hundredweight =1231 lbs. avoirdupois; the metze, the largest

dry measure = 1.7 bushel; the *eimer* = 14.94 wine gallons; the *joch* of land = 1.43 acres.

None of the European states except Russia exhibits such a diversity of race and language as the Austrian Empire. The Slavs-who differ greatly, however, among themselves in language and civilization — amount to above 16,000,000, or 45 per cent. of the total population, and form the great mass of the population of Bohemia, Moravia, Carniola, Galicia, Dalmatia, Croatia, and Slavonia, and northern Hungary, and half the population of Silesia and Bukowina. The Germans, about 9,000,000, form almost the sole population of the archduchy of Austria, Salzburg, the greatest portion of Styria and Carinthia, almost the whole of Tyrol and Vorarlberg, large portions of Bohe-mia and Morarlberg, large portions of Bohemia and Moravia, the whole of west Silesia, etc.; and they are also numerous in Hungary and Transylvania. The Magyars or Hungarians (6,300,000) form the bulk of the inhabitants of the kingdom of Hungary and eastern Transylvania. Of the Italic or western Romanic stock there are about 700,-000, and in the southeast about 2,500,000 of the Roumanian or eastern Romanic stock. The number of Jews is above 1,000,000; and there are other races, such as the Gypsies (150,000), who are most numerous in Hun-gary and Transylvania, and the Albanians in Dalmatia and the adjacent parts. The population, generally speaking, decreases in density from west to east.

The state religion of Austria is the Roman Catholic, but the civil power exercises supreme control in all ecclesiastical matters. In 1890 there were in the Austrian portion of the monarchy 18,934,000 Roman Catholics, 2,814,000 Greek Catholics united to the Roman Church, 493,542 non-united, 436,000 Protestants, and 1,143,000 Jews. In Hungary and Transylvania there were 6,478,731 Roman Catholics, 1,486,903 Greek united, and 1,931,-276 non-united, 3,139,758 Protestants, and 624,-680 Jews.

The intellectual culture of the people is highest in the German provinces, but in some of the other provinces the illiterates number as many as 80 to 90 per cent. Yet for a number of years attendance on the elementary schools has been compulsory on all children from their sixth to the end of their twelfth year; and there are higher schools on which attendance is compulsory for young people of thirteen to fifteen years (not elsewhere educated). There are numerous gymnasia and "real-schools," the gymnasia being intended chiefly to prepare pupils for the universities, while in the real-schools a more practical end is kept in view, and modern languages and physical science form the groundwork of the educational course; also agricultural, commercial, industrial, art, music, and other special schools. There are eleven universities: viz., in Vienna, Prague (2), Budapest, Gratz, Cracow, Lemberg, Innsbruck, Klausenburg, Agram, and Czernowitz. Most of these have four faculties—Catholic theology, law and politics, medicine, and philosophy.

The ruler of the Austro-Hungarian monarchy has the title of emperor so far as concerns his Austrian dominions, but he is only king of Hungary. All matters affecting the joint interests of the two divisions of the empire, such as foreign affairs, war, and finance, are dealt with by a supreme body known as the Delegations-a parliament of 120 members, one half of whom are chosen by and represent the legislature of German-Austria, and the other half that of Hungary. The legislative center of the Austrian division of the empire is the Reichsrath, or council of the realm, consisting of an upper house (Herrenhaus), composed of princes of the imperial family, nobles with the hereditary right to sit, archbishops, and life-members nominated by the emperor; a lower house (Abgeordnetenhaus) of 353 elected There are seventeen provincial deputies. diets or assemblies, each provincial division having one. In the Hungarian division of the empire the legislative power is vested in the king and the diet or Reichstag conjointly, the latter consisting of an upper house or house of magnates and of a lower house or house of representatives, the latter elected by all citizens of full age paying direct taxes to the amount of \$4 a year. The powers of the Hungarian Reichstag correspond to those of the Reichsrath of the Cisleithan provinces. There Reichsrath of the Cisleithan provinces. being three distinct parliaments in the empire, there are also three budgets: viz., that for the whole empire, that for Cisleithan, and that for Transleithan Austria. A small por-tion of the imperial revenue of Austria is de-rived from customs and other sources, 70 per cent. of the remainder being made up by the Cisleithan and 30 per cent. by the Transleithan divisions of the empire.

Military service is obligatory on all citizens capable of bearing arms who have attained the age of twenty. The period of service is twelve years, of which three are passed in the line, seven in the reserve, and two in the landwehr. The army numbers over 290,000 men (including officers) on the peace-footing and over 1,500-000 on the war-footing. The most important portion of the Austrian navy comprises 12 iron-clads, of from 5 to 14-inch armor, the largest having a tonnage of over 7,000, and carrying 27-ton guns; besides gun-boats, torpedo vessels, and other vessels, mostly small and intended for coast defense. The crews number about 10,000 officers and men.

History. — In 791 Charlemagne drove the Avars from the territory between the Ens and the Raab, and united it to his empire under the name of the *Eastern Mark* (that is, March or boundary land); and from the establishment by him of a margravate in this new province the present empire took its rise. On the invasion of Germany by the Hungarians it became subject to them from 900 till 955, when Otho I, by the victory of Augsburg, reunited a great part of this province to the German Empire, which by 1043 had extended its limits to the Leitha. The margravate of Austria was

hereditary in the family of the counts of Babenberg (Bamberg) from 982 till 1156, in which year the boundaries of Austria were extended so as to include the territory above the Ens, and the whole was created a duchy. The territory was still further increased in 1192 by the gift of the duchy of Styria as a fief from the Emperor Henry VI, Vienna being by this time the capital. The male line of the house of Bamberg became extinct in 1246, and the Emperor Frederick II declared Austria and Styria a vacant flef, the hereditary property of the German emperors. In 1282 the emperor Rudolph granted Austria, Styria, and Ca-rinthia, to his two sons, Albert and Rudolph. The former became sole ruler (duke), and since then Austria has been under the still reigning house of Hapsburg. Albert, who was an energetic ruler, was elected emperor in 1298, but was assassinated in 1308. The first of his successors we need specially mention. was Albert V, son-in-law of the Emperor Sigismund. He assisted Sigismund in the Hussite wars, and was elected after his death king of Hungary and of Bohemia, and German emperor (1438). Ladislaus, his posthumous son, was the last of the Austrian line proper, and its possessions devolved upon the collateral Styrian line in 1457; since which time the house of Austria furnished an unbroken succession of German emperors.

In 1453 the Emperor Frederick III, a member of this house, had conferred upon the country the rank of an archduchy before he himself became ruler of all Austria. His son, Maximilian I, by his marriage with Mary, the surviving daughter of Charles the Bold, united the Netherlands to the Austrian dominions. After the death of his father in 1493 Maximilian was made emperor of Germany, and transferred to his son Philip the government of the Netherlands. He also added to his paternal inheritance Tyrol, with several other territories, particularly some belonging to Bavaria, and acquired for his family new claims to Hungary and Bohemia. The marriage of his son Philip to Joanna of Spain raised the house of Hapsburg to the throne of Spain. Philip, however, d. in 1506, and the death of Maximilian in 1519 was followed by the union of Spain and Austria; his grandson (the eldest son of Philip), Charles I, king of Spain, being elected em-peror of Germany as Charles V. Charles thus became the greatest monarch in Europe, but in 1521 he ceded to his brother Ferdinand all his dominions in Germany. Ferdinand I, by his marriage with Anna, the sister of Louis II, king of Hungary, acquired the kingdoms of Hungary and Bohemia. with Moravia, Silesia, and Lusatia, the appendages of Bohemia. To oppose him the waywode of Transylvania, John Zapolya, sought the help of the sultan, Solyman II, who appeared in 1529 at the gates of Vienna, but was compelled to retreat. In 1535 a treaty was made by which John von Zapolya was allowed to retain the royal title and half of Hungary, but after his death new disputes arose, and Ferdinand maintained the possession of Lower Hungary only

by paying Solyman the sum of 30,000 ducats annually (1562). In 1556 Ferdinand obtained the imperial crown, when his brother Charles laid by the scepter for a cowl. He died in 1564, leaving his territories to be divided among his three sons.

Maximilian II, the eldest, succeeded his father as emperor, obtaining Austria, Hungary, and Bohemia; Ferdinand, the second son, received Tyrol and Hither Austria; and Charles, the youngest, obtained Styria, Carinthia, Carniola, and Gorz. Maximilian d. in 1576, and was succeeded on the imperial throne by his eldest son Rudolph II, who had already been crowned king of Hungary in 1572, and king of Bo-hemia in 1575. Rudolph's reign was dis-tinguished by the war against Turkey and Transylvania; the persecutions of the Prot-estants, who were driven from his domin-ions; the cession of Hungary in 1608; and in 1611 of Bohomic and his barediary cetter in 1611 of Bohemia and his hereditary estates in Austria to his brother Matthias. Matthias. who succeeded Maximilian on the imperial throne, concluded a peace with the Turks, but was disturbed by the Protestant Bohemians, who took up arms in defense of their religious rights, thus commencing the Thirty Years' War. After his death in 1619 the Bohemians refused to acknowledge his successor, Ferdinand II, until after the battle of Prague in 1620, when Bohemia had to submit, and was deprived of the right of choosing her king. Lutheranism was strictly forbidden in all the Austrian dominions. Hungary, which revolted under Bethlem Gabor, prince of Transylvania, was, after a long struggle, subdued. During the reign of Ferdinand III (1637-57), successor of Ferdinand II, Austria was continually the theater of war; Lusatia was ceded to Saxony in 1635; and Alsace to France in 1648, when peace was restored in Germany by the Treaty of Westphalia.

The emperor, Leopold I, son and successor of Ferdinand III, was victorious through the talents of Eugene in two wars with Turkey; and Vienna was delivered by Sobieski and the Germans from the attacks of Kara Mustapha in 1683. In 1687 he united Hungary to Transylvania, and in 1699 restored to Hungary the country lying between the Danube and the Theiss. It was the chief aim of Leopold to Theiss. secure to Charles, his second son, the inheritance of the Spanish monarchy, and in 1701, upon the victory of French diplomacy in the appointment of the grandson of Louis XIV, the War of the Spanish Succession began. Leopold d. in 1705, but Joseph I, his eldest son, continued the war. As he d. without children in 1711, his brother Charles was elected emperor, but was obliged to accede in 1714 to the Peace of Utrecht, by which Austria received the Netherlands, Milan, Mantua, Naples, and Sardinia. In 1720 Sicily was given to Austria in exchange for Sardinia. This monarchy now embraced over 190,000 sq. mi.; but its power was weakened by new wars with Spain and France. In the peace concluded at Vienna (1735 and 1738) Charles VI was forced to cede Naples and Sicily to Spain and part of Milan to the king of Sardinia, and in 1730, by the Peace of Belgrade, he was obliged to transfer to the Porte, Belgrade, Servia, etc., partly in order to secure the succession to his daughter Maria Theresa by the Pragmatic Sanction. He d. in 1740.

On the marriage of Maria Theresa with Stephen, the duke of Lorraine (the dynasty henceforth being that of Hapsburg-Lorraine), and her accession to the Austrian throne, the empire was threatened with dismemberment. Frederick II of Prussia subdued Silesia; the elector of Bavaria was crowned in Lintz and Prague, and in 1742 chosen emperor under the name of Charles VII; Hungary alone supported the heroic and beautiful queen. Charles, however, d. in 1745, and the husband of Theresa was crowned emperor of Germany as Francis I; but a treaty concluded in 1745 confirmed to Frederick the possession of Silesia, and by the Peace of Aix-la-Chapelle, 1748, Austria was obliged to cede the duchies of Parma, Piacenza, and Guastalla to Philip, Infant of Spain, and several districts of Milan to Sardinia. To recover Silesia, Maria Theresa formed an alliance with France, Russia, Saxony, and Sweden, and entered upon the Seven Years' War; but by the Peace of Hubertsberg, 1763, Silesia was recognized as Prussian territory. On the death of Francis I in 1765, Joseph II, his eldest son, was appointed to assist his mother in the government and elected emperor of Germany. The partition of Poland (1772) gave Galicia and Lodomeria to Austria, which also obtained Bukowina from the Porte in 1777, At the death of the empress in 1780 Austria contained 235,000 sq. mi., with a pop. est. 24,000,000.

The liberal home administration of the empress was continued and extended by her successor, Joseph II, who did much to further the spread of religious tolerance, education, and the industrial arts. The Low Countries, however, revolted, and he was unsuccessful in the war of 1788 against the Porte. His death took place in 1790. He was succeeded by his eldest brother, Leopold II, under whom peace was restored in the Netherlands, and in Hungary, and also with the Porte. On the death of his sister and her husband, Louis XVI, of France, he formed an alliance with Prussia, but died in 1792, before the French Revolutionary War broke out.

His son, Francis II, succeeded, and was elected German emperor, by which time France had declared war against him as king of Hungary and Bohemia. In 1705, in the third division of Poland, West Galicia fell to Austria, and by the Peace of Campo-Formio (1797) she received the largest part of the Venetian territory as compensation for her loss of Lombardy and the Netherlands. In 1709 Francis, in alliance with Russia, renewed the war with France until 1801, when the Peace of Lunéville was concluded. In 1804 Francis declared himself hereditary emperor of Austria as Francis I, and united all his states under the name of the Empire of Austria, immediately taking up arms once more

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with his allies, Russia and Great Britain, against France. The war of 1805 was terminated by the Peace of Pressburg (Dec. 26), by which Francis had to cede to France the remaining provinces of Italy, as well as to give up por-tions of territory to Bavaria, Würtemberg, and Baden, receiving in return Salzburg and Berchtesgaden. After the formation of the Confederation of the Rhine (July 12, 1806) Francis was forced to resign his dignity as emperor of Germany, which had been in his family more than 500 years. A new war with France in 1809 cost the monarchy 42,380 sq. mi. of territory and 3,500,000 subjects. Napoleon married Maria Louisa, daughter of the emperor, and in 1812 concluded an alliance with him against Russia. But in 1813 Francis again declared war against France, and formed an alliance with Britain, Russia, Prussia, and Sweden against his son-in-law. By the Congress of Vienna (1815) Austria gained Lombardy and Venetia, and recovered, together with Dalmatia, the hereditary territories which it had been obliged to cede.

In the troubled period following the French Revolution of 1830 insurrections took place in Modena, Parma, and the Papal States (1831-32), but were suppressed without much difficulty; and though professedly neutral during the Polish insurrections Austria clearly showed herself on the side of Russia, with whom her relations became more intimate as those between Great Britain and France grew more cordial. The death of Francis I (1835) and accession of his son Ferdinand I made little change in the Austrian system of government, and much discontent was the consequence. In 1846 the failure of the Polish insurrection led to the incorporation of Cracow with Austria. In Italy the declarations of Pio Nono in favor of reform increased the difficulties of Austria, and in Hungary the opposition under Kossuth and others assumed the form of a great constitutional movement. In 1848, when the expulsion of Louis Philippe shook all Europe, Metternich found it impossible any longer to guide the helm of the state, and the government was compelled to admit a free press and the right of citizens to arms. Apart from the popular attitude in Italy and in Hungary, where the Diet declared itself permanent under the presidency of Kossuth, the insurrection made equal progress in Vienna itself, and the royal family, no longer in safety, removed to Innsbruck. After various ministerial changes the emperor abdicated in favor of his nephew, Francis Joseph; more vigorous measures were adopted, and Austria, aided by Russia, reduced Hungary to submission.

The year 1855 is memorable for the Concordat with the pope, which put the educational and ecclesiastical affairs of the empire entirely into the hands of the Papal See. In 1850 the hostile intentions of France and Sardinia against the possessions of Austria in Italy became so evident that she declared war by sending an army across the Ticino; but after disastrous defeats at Magenta and Solferino she was compelled to cede Milan and the n.w. portion of Lombardy to Sardinia. In 1864 she joined with the German states in the spoliation of Denmark, but a dispute about Schleswig-Holstein involwed her in a war with her allies (1866), while at the same time Italy renewed her attempts for the recovery of Venice. The Italians were defeated at Custozza and driven back across the Mincio; but the Prussians, victorious at Königgrätz (or Sadowa), threatened Vienna. Peace was concluded with Prussia on August 23, and with Italy on October 3, the result of the war being the cession of Venetia through France to Italy and the withdrawal of Austria from all interference in the affairs of Germany.

Since 1866 Austria has been occupied chiefly with the internal affairs of the empire. Hungarian demands for self-government were finally agreed to, and the empire of Austria divided into the two parts already mentioned -the Cisleithan and the Transleithan. This settlement was consummated by the coronation of the Emperor Francis Joseph I, at Budapest, as king of Hungary, on the 8th of June, 1867. In the same year the Concordat of 1855 came up for discussion, and measures were passed for the re-establishment of civil marriage, the emancipation of schools from the domination of the church, and the placing of different creeds on a footing of equality. The fact of the Austro-Hungarian dominions comprising so many different nationalities has always given the central government much trouble, both in regard to internal and to external affairs. In regard to the "Eastern Question," for instance, the action of Austria has been hampered by the sympathies shown by the Magyars for their blood relations, the Turks, while the Slavs have naturally been more favorable to Russia. During the war between Russia and Turkey in 1877-78 Austria remained neutral: but at its close, in the middle of 1878, it was decided, at the Congress of Berlin, that the provinces of Bosnia and Herzegovina should in future be administered by Austria-Hungary instead of Turkey. Recently there has been a likelihood of Austria being involved in hostilities with Russia in connection with the "Eastern Question;" and in February, 1888, a treaty between Austria and Germany was published, by which each agreed to assist the other in the case of an attack by Russia.

Autom aton, a self-moving machine performing actions like those of a living being, and often shaped like one. The walking statues of Dædalus, the flying dove of Archytas, the brazen head of Friar Bacon, the iron fly of Regiomontanus, the door-opening figure of Albertus Magnus, the parading knights of the clock presented to Charlemagne by Harun al Rashid, the toy carriage and attendants constructed by Camus for Louis XIV, the flute player, tambour player, and duck of Vaucanson, and the writing child of the brothers Droz are among the more noteworthy of traditional automata.

Au'totype, a species of photographic print. A tin sheet of gelatin on paper is rendered sensitive to light by treatment with bichromate of potash, and then exposed under an ordinary photographic negative. The portions of gelatin affected by the light become insoluble, the remainder of the gelatin is then washed away, and the picture remains reproduced in the gelatin, there being slight elevations and depressions corresponding with the distribution of light and shade. This may be printed from, but it is more often made use of to obtain electrotypes or other reverses, from which impressions can more easily be taken.

Autum (ö-tun), a town, southeastern France, department of Saône-et-Loire. It has two Roman gates of exquisite workmanship, the ruins of an amphitheater and of several temples, the cathedral of St. Lazare, a fine Gothic structure of the eleventh century; manufactures of carpets, woolens, cotton, velvet, hosiery, etc. Pop. 11,462.

Auvergne (ö-vär-nyė), a province, central France, now merged into departments Cantal and Puy-de-Dôme, and an arrondissement of Haute-Loire. The Auvergne Mountains, separating the basins of the Allier, Cher, and Creuse from those of the Lot and Dordogne, contain the highest points of central France: Mount Dor, 6, 188 ft.; Cantal, 6,093 ft., and Puy-de-Dôme, 4,800 ft. The number of extinct volcances and general geologic formation make the district one of great scientific interest. The minerals include iron, coal, copper, and lead, and there are warm and cold mineral springs. Auvergne contributes a large supply to the labor markets of Paris and Belgium, there being in Paris alone some 50,000 Auvergnats.

Auxerre ( $\delta$ -s $\tilde{s}r$ ), a town, France, department of Yonne, 110 mi. s.e. of Paris. Principal edifices: a fine Gothic cathedral, unfinished; the abbey of St. Germain, with curious crypts; and an old episcopal palace, now the Hôtel de Prefecture. It manufactures woolens, hats, casks, leather, earthenwarz, violin strings, etc.; trade, chiefly in wood and wines, of which the best known is white Chablis. Pop. 15,497.

Av'alanches, large masses of snow or ice precipitated from the mountains, and distinguished as wind or dust avalanches, when they consist of fresh-fallen snow whirled like a dust storm into the valleys; as sliding avalanches, when they consist of great masses of snow sliding down a slope by their own weight; and as glacier or summer avalanches, when ice-masses are detached by heat from the high glaciers. Avalanches have been divided into four classes: 1, Powdery avalanches, in which the snow and ice break up into powder, forming a kind of silver cloud, sparkling like quicksilver, and This making a noise like distant thunder. kind is more dangerous by reason of the commotion produced in the air than by its weight or power to overwhelm. 2, Creeping avalanches. The mass of snow being disengaged moves down a more gentle slope, as on an inclined plane, and so is sluggish in its course. 3, Glacier avalanche, consisting of a large mass of ice detached from the glacier above, which descends to the valley. This is the least dangerous kind, and is more common in summer. 4, The avalanche proper, which is the most dangerous of all, and consists of vast accumulations of snow set free from above, which increase in force as they descend, overthrowing houses, tearing up trees, burying villages, and swallowing up forests, cattle, and human beings. Avalanches are sometimes of immense size; two which fell in the Alpine districts of Italy, in 1885, contained 45,000 and 250,000 tons of snow respectively.

Av'alon, a sort of fairy land or elysium mentioned in connection with the legends of King Arthur, being his abode after disappearing from the haunts of men; called also Avilion. The name is also identified with Glastonbury, and has been given to a peninsula of Newfoundland.

Avatar' (more properly Avatara), in Hindu mythology, an incarnation of the Deity. Of the innumerable avatars the chief are the ten incarnations of Vishnu, who appeared successively as a fish, a tortoise, a boar, etc.

Avelline ( $\dot{a}$ -vel-le'n $\bar{e}$ ), a town in Southern Italy, capital of the province of Avellino, 20 mi. e. of Naples, the seat of a bishop. Avellino nuts were celebrated under the Romans. Pop. 16,376. Area of the prov. 1,400 sq. mi.; pop. 419,688.

A've **Flari'a** ("Hail, Mary"), the first two words of the angel Gabriel's salutation (Luke 1:28), and the beginning of the very common Latin prayer to the Virgin in the Catholic Church. Its lay use was sanctioned at the end of the twelfth century, and a papal edict of 1326 ordains the repetition of the prayer thrice each morning, noon, and evening, the hour being indicated by sound of bells called the Ave Maria or Angelus Domini.

Av'erage, in maritime law, any charge or expense over and above the freight of goods, and payable by their owner. General acerage is the sum falling to be paid by the owners of ship, cargo, and freight, in proportion to their several interests, to make good any loss or expense intentionally incurred for the general safety of ship and cargo; e. g., throwing goods overboard, cutting away masts, port dues in cases of distress, etc. Particular acerage is the sum falling to be paid for unavoidable loss when the general safety is not in question, and therefore chargeable on the individual owner of the property lost. A policy of insurance generally covers both general and particular average, unless specially excepted.

Aver'ill, WILLIAM WOODS, b. 1832, in Cameron, N. Y. He was graduated at the U. S. Military Academy in 1855, and served in garrison at Carlisle, Pa., for two years. Later he went to the frontier to fight the Indians. He was in the battle of Bull Run. Averill was appointed colonel of the third Pennsylvania cavalry, and commanded the cavalry defenses before Washington with the Army of the Potomac, 1863. He made a series of cavalry raids in Virginia. Later he had sundry skirmishes with the Confederates with some success, but met with no disaster. In 1865 he

## Avernus

resigned. From 1866 to 1869 he was U.S. consul-general in the British Provinces of N. A.

Aver' nus, a lake, now called Lago d'Averno, in Campania, Italy, between the ancient Cumæ and Puteoli, about 8 mi. from Naples. It occupies the crater of an old volcano, and is in some places 180 feet deep. Formerly the gloom of its forest surroundings and its mephitic exhalations caused it to be regarded as the entrance to the infernal regions. It was the fabled abode of the Cimmerians, and especially dedicated to Proscrpine.

Averroes (1120-1225 ?), a noted Arabian philosopher. Averroes regarded Aristotle as the greatest of all philosophers, and devoted himself so largely to the exposition of his works as to be called among the Arabians the Interpreter. He wrote a compendium of medicine, and treatises on theology, philosophy, jurisprudence, etc.

Aver'sa, a town of southern Italy, 7 mi. n. of Naples, in a beautiful vine and orange district, the seat of a bishop, with a cathedral and various religious institutions, and an excellently conducted lunatic asylum. Andreas of Hungary, husband of Queen Joanna I, was strangled in a convent here, Sept. 18, 1345. Pop. 21,510.

Aveyron (å-vå-rön), a department of France. The climate is cold, and agriculture is in a backward state, but considerable attention is paid to sheep-breeding. It is noted for its "Roque-fort cheese." It has coal, iron, and copper mines, besides other minerals. Area 3,340 sq.

mi.; capital, Rhodez; pop. 415,826. Av'lary, a building or enclosure for keeping, breeding, and rearing birds. Aviaries appear to have been used by the Persians, Greeks, and Romans, and are highly prized in China. In England they were in use at least as early as 1577, when William Harrison refers to "our costlie and curious aviaries." An aviary may be simply a kind of very large cage; but the term usually has a wider scope than this. The zoological collections in several American parks are noticeable for their fine aviaries.

Avicen'na (or Ebn-Sina) (980-1037), an Arabian philosopher and physician. At the age of twenty-one he wrote an encyclopedia of the sciences, but of his one hundred works the best known is the Canon Medicina, which was still in use as a text-book at Louvain and Montpellier in the middle of the seventeenth century

Avigilano (a-věl-yä'nö), a town of Southern Italy, prov. Potenza. Pop. 13,057.

Avignon (à-vē-nyōn), an old town of s. e. France, capital of department Vaucluse. It is an archbishop's see, and has a large and ancient cathedral on a rock overlooking the town, the immense palace in which the popes resided (now barracks), and other old build-The silk manufacture and the rearing ings. of silkworms are the principal employments in the district. Here Petrarch lived several years, and made the acquaintance of Laura, whose tomb is in the Franciscan church. From 1309 to 1376 seven popes in succession, from Clement V to Gregory XI, resided in

this city. After its purchase by Pope Clement VI in 1348 Avignon and its district continued, with a few interruptions, under the rule of a vice-legate of the pope, till 1791, when it was formally united to the French Republic. Pop. 41,007

Avila (ä'vē-lå), town of Spain, capital of province of Avila, a modern division of Old Castile. See of a bishop suffragan, with fine cathedral. Once one of the richest towns of Spain. Principal employment in the town, spinning; in the province, breeding sheep and cattle. Pop. town 9,199; province 187-211.

Avogad'ro's Law, in physics, asserts that equal volumes of different gases at the same pressure and temperature contain an equal number of molecules.

Avoirdupois (a-ver'du-pois)(from old French, lit. "goods of weight"), a system of weights used for all goods except precious metals, gems, and medicines, and in which a pound contains 16 ounces, or 7,000 grains, while a pound troy contains 12 ounces, or 5,760 grains.

Av'ola, a seaport on the east of Sicily, with a trade in almonds, sugar, etc. Pop. 12,540.

A'von, the name of several smaller rivers in England of which the most famous rises in Leicestershire, flows past Shakespeare's birth-

place, Stratford, and falls into the Severn. Av'oset, a bird about the size of a lapwing. The bill is long, slender, elastic, and bent upward toward the tip, the legs long, the feet



The Common Avoset.

webbed, and the plumage variegated with black and white. The bird feeds on worms black and white. and other small animals which it scoops up from the mud of the marshes and fens that it frequents. It is found in Europe, Asia, Africa, and America; but the American species is slightly different from the other.

Ax, a well-known tool for cutting or chopping wood, consisting of an iron head with an arched cutting edge of steel, which is in line with the wooden handle of the tool, and not at right angles to it as in the adze.

The process of making axes is briefly as fol-ws: The raw material is brought into the lows: factory in great rough and rusty iron bars. It is put into the forges and heated until it is a



rich red. The workmen withdraw it by means of tackle and feed it between the rollers of a complicated machine, which cuts the bars into lengths double that of the ax, and shapes the metal in the general form of two axes placed butt to butt, and finally doubles the pieces together around a mold, thus leaving a loop in the middle for the helve-hole. The ax is then put into a furnace fired with gas, and raised to a white heat; thence it is carried to the base of a great tilt-hammer, which drops down upon it with terrific force, welding the folds together with a single blow. The ax is again taken to the furnace and heated red hot. It is then taken in hand by a workman who rasps its edges with a sharp saw to take off the jagged fringe of iron which still clings to it. Thus the iron part of the ax, that is, all of the butt and most of the blade, is complete. The steel for the knife-edge is heated at the furnace and then stamped into the desired shape by a die press. The two parts are now ready to be put together. A groove is cut into the forward edge of the iron butt and the steel knife-edge inserted. The whole ax is then heated and welded together with the great hammer. The blade of the ax has yet to be tempered, and this is the most important part of the work. The latest method of tempering is to dip the steel ax-blade into a pot of molten lead, and when sufficiently hot, to transfer it quickly into a vat of cold water. An experienced inspector then tests the blade to find out whether or not it is too brittle or not brittle enough. If it will not stand the test it is thrown aside, and the whole process must be gone over again. If the ax fulfills the requirements of the inspector it goes to the grindingroom, where it is smoothed, ground, and polished and put in shape for use.

Axis, the straight line, real or imaginary, passing through a body or magnitude, on which it revolves, or may be supposed to revolve; especially a straight line with regard to which the different parts of a magnitude, or several magnitudes, are symmetrically arranged; e.g. the axis of the world, the imaginary line drawn through its two poles.

In botany the word is also used, the stem being termed the ascending axis, the root the descending axis.

In analomy the name is given to the second vertebra from the head, that on which the *atlas* moves.

Axle, a bar of iron or wood which supports a carriage or wagon and is supported on wheels, in the hubs of which its ends are inserted. Axles of railway cars do not revolve in the hubs of the wheels, but are keyed in them, and journals are turned on the portions outside the wheel. The manufacture of car axles is an interesting process. The enormous weight which falls upon a car or locomotive axle requires that they be made of the strongest iron obtainable. Axles under loaded freight cars for example must support a constant load of about ten tons, while the oscillation and vibration of the car, which sometimes throws the whole weight upon on eside, requires that the

axle be exceedingly strong. Axles as usually manufactured are made of scrap iron and muckbar iron. The scrap iron used in making axles consists of old bridge rods, old axles, and arch bars. These scraps before brought into the mill are cut into four-foot lengths by powerful shears. These four-foot pieces are put into a furnace with a slow fire where the rust and dirt are burned off, thus preventing any impurities in the welding. The pieces are assorted into piles of sufficient size to make an axle of given dimensions. The piles are then put into the heating furnace, three or four at a time, and heated to the welding point. A pair of huge tongs suspended from a crane by a heavy chain is swung around by a workman, and attached to the projecting end of one of the piles of iron, which by this time has been heated sufficiently to cause the different pieces to stick together. The mass is then swung around under the steam hammer. This hammer weighs about two tons. It is put in operation, and the hammer man takes hold of the end of the tongs, and after each blow of the hammer, changes the position of the iron so that no two blows will strike in exactly the same place. As soon as the iron becomes a little cool it is put back into the furnace and another piece is taken out and hammered in the same way. For the first hammering, when the slabs are being made, a flat hammer-block and hammer is used. After this a concave hammer face and hammerblock are substituted to give the correct shape of the axle. During the process of the hammering, the correct diameter is determined by means of a guage. After both ends of the axle have been finished it is swung on to a skid made of two steel rails and allowed to cool. It is important that any pieces of steel be kept out of the axle in the welding. When the axle is thoroughly cooled it is lifted from the steel rails by means of tongs, and placed into a machine which cuts it off into the correct Then the axle is centered by having length. a small hole bored in exactly the center of each end, and is taken to the finishing room. The finishing process consists in putting the axle into a lathe and turning off some of the metal at each end so as to make a smooth surface for the bearings and wheel hub. The axle is now ready to have the wheels mounted on it. The wheels are pressed on to the axle by a powerful hydraulic press, and so accurate is the fit that it is said the union is stronger than if the wheel and axle had been heated and welded together.

Steel cannot be welded readily, and the method of making steel axles is somewhat different from that of making iron axles. Either Bessemer or open-hearth steel is used in steel axles. The steel is first melted and poured from the converters into ingots, which are then passed through rollers and brought down to pieces about six or seven inches square. The pieces are then heated in the furnace and pounded down to the correct form and diameter under the steam hammer in the same manner as an iron axle. Steel axles are not

-14

### Aye-aye

considered as good as iron on account of the danger of blow-holes forming in the interior of These blow-holes are made when the axle. the steel is being poured into the ingots and no amount of rolling or pounding will close them up, nor is there any way of telling when these holes occur inside of an axle until it breaks in service. The methods of working steel, however, are being greatly improved, and it will probably not be long until it will entirely replace iron for axles. Axles weigh from 350 to 425 pounds and at present are worth when made about \$8.50 each. Locomotive axles are much larger and heavier and weigh about 800 pounds each and have a diameter at the middle of seven or eight inches. Whenever an axle breaks it is usually in the journal near the wheel pit.

Aye-aye (1-1), an animal of Madagascar, so called from its cry, now referred to the lemur family. It is about the size of a hare, has large flat ears and a bushy tail, large eyes, long sprawling fingers, the third so slender as



#### Aye-Aye.

to appear shrivelled; color, musk-brown, mixed with black and gray ash. It feeds on grubs and fruits, and in its habits is nocturnal.

**Ayesha** (a-yesh'a) (610-678), daughter of Abu-Bekr and favorite wife of Mohammed, the Arabian prophet.

Ayr (kr), a town of Scotland, capital of Ayrshire. William the Lion built a castle here in 1197 and constituted it a royal burgh in 1202; and the parliament which confirmed Robert Bruce's title to the crown sat in Ayr. One of its bridges, opened in 1879, occupies the place of the "New Brig" of Burns's Brigs of Ayr, the "Auld Brig" (built 1252) being still serviceable for foot traffic. Carpets and lace curtains are manufactured. The house in which Robert Burns was born stands within 14 miles of the town, between it and the church of Alloway ("Alloway's auld haunted kirk"), and a monument to him stands on a height between the kirk and the bridge over the Doon. Pop. 23,835. Ayrshire has an area of 1.149 sq. mi. The surface is irregular, and a large portion of it hilly, but much of it is fertile. Coal and iron are abundant; and there are numerous collieries and iron-works. Limestone and freestone abound. Agriculture and dairy husbandry are extensively practised; the Ayrshire cows are celebrated as milkers. Woolen manufactures are extensive, particularly carpets, bonnets, and worsted shawls, produced in great quantities at Kilmarnock and other places. Pop. 226,283.

Aytoun, WILLIAM EDMONDSTOUNE (1813-1865), a Scotch poet and prose writer. In 1848 he published a collection of ballads entitled *Lays of the Scottish Cavaliers*, which has proved the most popular of all his works. In 1858 he edited a critical and annotated collection of the ballads of Scotland.

Aza'lea, a genus of plants, belonging to the heaths, remarkable for the beauty and fragrance of their flowers, and distinguished from



Flowering Branch of Azalea.

the rhododendrons chiefly by the flowers having five stamens instead of ten. Many beautiful rhododendrons with desiduous leaves are known under the name of *azalea* in gardens. Azaleas are common in North America. An Asiatic species is famous for the stupefying effect which its honey is said to have produced on Xenophon's army. is also common in gardens and shrubberies; and another is a brilliant greenhouse plant.

Azamgarh, a town of India, N. W. Provinces, capital of dist. of same name. Pop. 19,-450. The district has an area of 2,550 sq. mi.; a pop. of 1,728,625.

Azerbijan (à-zer-bī-jän'), a province of Persia. Area 30,000 sq. mi.; pop. est. at 750,000. It consists generally of lofty mountain ranges, some of which rise to a height of between 12,000 and 13,000 ft. Agricultural products: wheat, barley, maize, fruit, cotton, tobacco, and grapes. Horses, cattle, sheep, and camels are reared in considerable numbers. Chief minerals: iron, lead, copper, salt, saltpeter, and marble. Tabreez is the capital. On the n. w. frontier is situated Mount Ararat.

Azof, Sea of, an arm of the Black Sea, with which it is united by the Straits of Kertch (or Kaffa); length about 170 mi., breadth about 80 mi.; greatest depth not more than 8 fathoms. The w. part, called the Putrid Sea, is separated from the main expanse by a long sandy belt called Arabat, along which runs a military road. The sea teems with fish. The Don and other rivers enter it, and its waters are very fresh.

Azores (a-zörz' or a-zö'res) (or Western Islands), a group belonging to and 900 mi. west of Portugal, in the North Atlantic Ocean. They are nine in number, and form three distinct groups — a n. w., consisting of Flores and Corvo; a central, consisting of Terceira, São Jorge, Pico, Fayal, and Graciosa; and a s. e., consisting of Sao Miguel (or St. Michael) and Santa Maria. The total area is about 900 sq. mi.; São Miguel (containing the capital, Ponta Delgada), Pico, and Terceira are the largest. The islands are volcanic and subject to earthquakes, and are conical, lofty, precipitous, and picturesque. The most remarkable summit is the peak of Pico, about 7,600 feet high. There are numerous hot springs. They are covered with luxuriant vegetation, and diversified with woods, corn-fields, vineyards, lemon and orange groves, and rich open pastures. The mild and somewhat humid climate, combined with the natural fertility of the soil, brings all kinds of vegetable products rapidly to perfection. The climate is recommended as suitable for consumptive patients. The Azores were discovered by Cabral about 1431, shortly after which date they were taken possession of and colonized by the Portuguese. When first visited they were uninhabited, and had scarcely any other animals except birds, particularly hawks,

to which, called in Portuguese *açores*, the islands owe their name. Pop. 270,000.

Az'tecs, a race of people who settled in Mexico early in the fourteenth century, ultimately extended their dominion over a large territory, and were still extending their supremacy at the time of the arrival of the Spaniards, by whom they were speedily subjugated. Their most celebrated ruler was Montezuma, who was reigning when the Spaniards arrived, about the middle of the fifteenth century. Although ignorant of the horse, ox, etc., they had a considerable knowledge of agriculture, maize and the agave being the chief produce. In metal work, feather work, weaving and pottery they possessed a high degree of skill. To record events they used hieroglyphics; and their lunar calendars were of unusual accuracy. Two special deities claimed their reverence: Hintzilopochtli, the god of war, propitiated with human sacrifices; and Quetzalcoal, the beneficent god of light and air, with whom at first the Aztecs were disposed to identify Cortez. Their temples, with large terraced pyramidal bases, were in the charge of an exceedingly large priesthood, with whom lay the education of the young. As a civilization of apparently independent origin, yet closely resembling in many features the archaic Oriental civilizations, the Aztec civilization is of the first interest. See Mexico.

**B** is the second letter and the first consonant in the English and most other alphabets. It is a mute and labial, pronounced solely by the lips, and is distinguished from p by being sonant, that is, produced by the utterance of voice as distinguished from breath.

In music B is the seventh note of the model diatonic scale, or scale of C. It is called the leading note, as there is always a feeling of suspense when it is sounded until the keynote is heard.

**Ba'al** (Bel), a Hebrew and general Semitic word signifying simply lord, and applied to many different divinities. In Hosea 2:16 it is applied to Jehovah himself, while Baalberith (the Covenant-lord) was the god of the Shechemites, and Baal-zebub (the Fly-god) the idol of the Philistines at Ekron.

**Baalbek'**, a place in Syria, at the foot of Antilibanus, 40 mi. from Damascus, famous for its magnificent ruins. Of these the chief is the temple of the Sun, built either by Antoninus Pius or by Septimius Severus. Some of the blocks used in its construction are 60 ft. long by 12 ft. thick. Near it is a temple of Jupiter, of smaller size though still larger than the Parthenon at Athens. It became a Roman colony under Julius Cæsar, was garrisoned by Augustus, and acquired renown under Trajan as the seat of an oracle. It was sacked by the 'Arabs in 748, and more completely pillaged by Tamerlane in 1401; it sank into decay. The destruction was completed by an earthquake in 1759.

**Bab' bage**, CHARLES (1792-1871), an eminent English mathematician and inventor of the calculating machine. As early as 1812 he conceived the idea of calculating numerical tables by machinery, and in 1823 he received a grant from government for the construction of such a machine. After a series of experiments Babbage abandoned the undertaking in favor of an analytical engine, worked with cards like the Jacquard loom; but the project was never completed. The incompleted machine is now in the South Kensington Museum.

**Babbit-metal**, a soft metal resulting from alloying together certain proportions of copper, tin, and zinc or antimony, used with the view of as far as possible obviating friction in the bearings of journals, cranks, axles, etc., invented by Isaac Babbit (1799-1862), a goldsmith of Taunton, Mass.

**Babcock,** ORVILLE E. (1835-1884); b. in Franklin, Vt. He graduated at West Point, served during the whole of the Civil War, and served as aide-de-camp to General Grant. Colonel Babcock acted as Grant's secretary 1869-71, when he was appointed superintendent of buildings in the District of Columbia. In 1876 he was indicted for complicity in the whiskyring frauds, but was acquitted.

# Baboon

**Babel**, Tower of, a structure in the plain of Shinar, Mesopotamia, commenced by the descendants of Noah subsequent to the deluge. It has commonly been identified with the great temple of Belus (or Bel) that was one of the chief edifices in Babylon, and the huge mound called Birs Nimrud is generally regarded as its site, though another mound, which to this day bears the name of Babil, has been assigned by some as its site. Babel means literally "gate of God."

**Bab-el-Mandeb** ("gate of tears," from being dangerous to small craft), a strait, 15 mi. wide, between the Indian Ocean and the Red Sea, formed by projecting points of Arabia in Asia, and Abyssinia in Africa. The island of Perim is here.

**Ba'ber** (1483-1530), first grand Mogul, the founder of the Mogul dynasty in Hindustan. He was sovereign of Cabul. He several times invaded Hindustan, and in 1525 killed Sultan Ibrahim, the last Hindu emperor of the Afghan race. He made many improvements, social and political, in his empire, and left a valuable autobiography.

**Ba' boon**, a common name applied to a division of old-world apes and monkeys. They have



Sacred Baboon.

elongated, abrupt muzzles like a dog, strong tusks or canine teeth, usually short tails, cheekpouches, small, deep eyes with large eyebrows and naked callosities on the buttocks. Their hind and fore feet are well proportioned, so that they run easily on all fours, but they do not maintain themselves in an upright posture with facility. They are generally of the size of a moderately large dog, but the largest, the mandrill, is, when erect, nearly of the height of a man. They are almost all African, ugly, sullen, flerce, and gregarious, defending themselves by throwing stones, dirt, etc. They live



# BACTERIA.

1. Tubercle Bacillus (Bacillus Tuberculosis, Koch). 2. Streptococcus Pyogenes. 3. Bacillus Anthracis, with Spores. 4. Spirillum Obermeiri in blood of relapsing fever. 5. Comma Bacillus of Asiatic Cholera. 6. Micrococcus Tetragenus (Saprophytic). • • • • •

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ments of the men are made in accordance with the numbers turned up by the dice. It is said to have been invented in the tenth century.

**Bacon**, DELIA (1811-1859), born in Ohio. She was a talented woman, who sought to prove that Francis Bacon was the author of the Shakespearean plays,

Ba'con, FRANCIS, Lord Verulam, Viscount St. Albans (1561-1626), known generally by Pope's characterization as "the wisest, bright-est, meanest of mankind." Queen Elizabeth playfully styled him her "young Lord Keeper." He studied at Trinity College, Cambridge, where, it is said, he acquired his hatred of Aristotelianism, and began to sketch his own scheme of philosophy. Leaving college, he went to Paris. There he occupied himself with diplomacy and scientific investigation until 1580, when the death of his father recalled him to England. His bright talents excited the alarm of his uncle, Lord Burleigh, then Premier, who saw in him a most formidable rival to his own son Robert. Although B. then paid court to Burleigh's rival, Essex, the latter was not powerful enough to prevent him from being defeated in his contest in 1594 for the attorney-generalship. To make up for this defeat, Essex presented B. with an estate at Twickenham worth \$10,000 a year. Yet B. is found as the chief persecutor of Essex, both by pen and tongue, for conspiracy against the queen, and although various attempts have been made to explain this away, it is impossible to acquit him of ingratitude. B., who had entered Parliament as member for Middlesex in 1595, rose rapidly in the reign of James I. He was knighted in 1603, became attorney-general in 1613, in which office he also shows himself in an unfavorable light, as countenancing the torture of an old clergyman of the name of Peacham by the rack; Keeper of the Great Seal in 1617, and in 1619, Lord Chancellor, with the title of Lord Veru-lam. Next year he was made Viscount St. Albans. It seems undoubted that B. abused the high position he had now attained, by taking advantage of his judicial functions to in-crease his revenues. The scandal became so great, that neither the king nor his favorite Villiers, to whom he had truckled in the most abject manner, could shield him from popular indignation; a parliamentary inquiry was in-stituted in 1621; B. confessed to twenty-three acts of corruption, and was sentenced to a fine of \$200,000, to be confined in the Tower during the king's pleasure, and to be banished for life from the court, and from public employment. Although the fine was remitted, and the imprisonment only lasted two days, B. never returned to public life, but on a pension of \$6,000 a year devoted himself to literature and science. His death took place in 1626, the common story being that he caught a chill while endeavoring to test the power of snow to preserve flesh. His debts amounted to \$110.000.

His intimacy with every department of human knowledge except mathematics is marvelous; while few writers have been more eloquent, more imaginative, or more witty. He will be best remembered as, "if not absolutely the father of the Inductive Philosophy, in the sense of the inventor of the method of interrogating nature by experiment and observation, the popularizer of that philosophy." Of late years an attempt has been made to ascribe to Bacon the authorship of the Shakespearean plays. Ingenious as some of the arguments have been, the balance of probability remains against such a theory.

**Bacon**, LEONARD (1802-1881), b. in Detroit, Mich. He graduated at Yale in 1820, and in 1825 was ordained pastor of the First Congregational church of New Haven, which pastorate he held until his death. He was professor of didactio theology in Yale, 1806-1871. Dr. Bacon edited *The Christian Spectator*, wrote for the *New Englander*, and founded and edited the *Independent* (1847).

**Bacon**, LEONARD WOOLSEY, b. 1830, in New Haven, Conn., son of the foregoing. He graduated at Yale in 1850, and studied theology at Andover and medicine at Yale. He served as pastor of churches in New York and Connecticut, and has written much for the religious press.

Bacon, ROGER (1214-1294), an English monk, and one of the most profound and original thinkers of his day. He first entered the University of Oxford, and went afterward to that of Paris, where he received the degree of Doctor of Theology. About 1250 he returned to England, entered the order of Franciscans, but having incurred the suspicion of his ecclesiastical superiors on a charge of practising "black art" or magic, he was sent to Paris and kept in confinement for ten years. Having been set at liberty, in 1278 he was again thrown into prison, where he remained for at least ten vears. His most important work is his Opus Majus, where he discusses the relation of philosophy to religion, and then treats of language, metaphysics, optics, and experimental science. He was intimately acquainted with geography and astronomy.

Bactería (Gr., Bakterion, a little staff), are minute unicellular vegetable organisms which multiply by transverse division. They are spherical, oval, rod-like, or spiral in shape and are devoid of chlorophyll, owing to the absence of which they are forced to lead a saprophytic life (obtaining nutrition from dead organic matter); or a parasitic life (obtaining nutriment from living matter). The rôle played in nature by the saprophytic bacteria is a very important one. Through their presence the highly complicated tissues of dead animal and vegetable matter are resolved into the simple compounds (carbonic acid, water, and ammonia) in which form they may be taken up and appropriated as nutrition by the more highly organized members of the vegetable kingdom. It is through this ultimate production of carbonic acid, water, and ammonia. as end-products in the process of decomposition and fermentation of the dead animal and vegetable tissues, that the demands of

growing vegetation for these compounds are supplied. Saprophytes must be looked upon in the light of "benefactors," without which existence would be impossible. With the parasites, on the other hand, the conditions are far from analogous. Through their activities there is constantly a loss to both the animal and vegetable kingdom. Their host must be a living body in which exist conditions favorable to their development and from which they appropriate substances necessary to the health of the organism to which they have found access; at the same time they eliminate substances as products of their nutrition that are directly poisonous to the tissues in which they are growing. For the growth of bacteria, organic matter of a neutral or slightly alkaline reaction, in the presence of moisture and a suitable temperature (41.9° F.-118.4° F.) is necessary. Some bacteria flourish in an atmosphere of oxygen, while to others the presence of this gas is a detriment, hence bacteria are divided into anærobic (not living in oxygen) and perobic (living in oxygen).

The principal forms of bacteria are:-

1. Micrococci.

2. Bacilli.

3. Spirilla.

The micrococci are small oval or round bodies which grow and multiply in various ways so that by their development we have formed the staphylococci (cocci in bunches). the streptococci (cocci in chains), diplococci (cocci in pairs), tetrads (cocci in fours), sarsing (cocci in squares, cubes, etc.). The most common of these micrococci are the pus microbes staphylococcus, golden, lemon-colored, and white, and the streptococcus. The bacilli are minute rodshaped organisms, and varied as to length, breadth, and thickness. The bacillus tuberculosis, the bacillus typhosis, and the bacillus anthracis are common examples of this form of microbe.

The spirilla are minute spiral or commashaped germs which sometimes present letter S curves and sometimes appear as though they were bacilli. Examples of this form are Spirillum Asiaticæ Choleræ and spirillum of Finkler-Prior.

'An important feature of certain bacteria is their power of spore formation, a process by which an organism is enabled to enter a state in which it resists influences deleterious to its growth. It is this property which renders certain germs so harmful, as in this state they resist chemical and physical agents that easily destroy life, even resisting the action of a temperature of 212º F. for several hours. The bacillus anthracis is a noticeable example of this. Certain bacteria possess the property of motility. The propelling power are hairlike appendages, called flagellie, projecting from various parts of the body-wall. This motility is an important point in bacteriologic diagnosis, and is possessed pre-eminently by the bacillus typhosis.

Bacteria are found everywhere (in air, soil, water, clothing, surface of bodies, mucous membrane, etc.), and they multiply so rapidly that, it has been estimated, one bacillus in 24 hours will produce 164 millions.

By their growth bacteria produce certain poisons, called *ptomaines* (saprophytic) and *tozalbumins* (parasitic). This action producing ptomaines is the cause of the numerous deaths reported from eating ice cream, sausage, and other substances. As an example of the poisonous effect of the tox-albumins we have the *bacillus diphtheria*, which acts by its toxine in producing the condition known as "intoxication."

For the artificial cultivation of bacteria in the laboratory certain media are used. As to the method of their preparation nothing need now be said, suffice it to say that the general media are gelatin, agar-agar, bouillon, glucose-agar, litmus milk, potato, blood-serum. Special media are used in certain cases as some germs grow feebly or not at all on one general culture ground. An example of a special medium is human blood-serum in the artificial cultivation of the gonococcus.

After the preparation of the media, it must be made perfectly sterile. This is accomplished by submitting it to the action of live steam for half an hour on three successive days. The object of this "fractional sterilization" is to kill the successive crops of spores as they develop, as a single steaming will not accomplish this purpose.

Having rendered our media sterile, we are in a condition to study bacteria systematically and thoroughly.

This in brief is as follows:----

1. At the post-mortem or during life a specimen is obtained from the selected site (scraping from mucous membrane in diphtheretic throat). This specimen is inoculated on a tube containing sterile agar-agar. This tube is then placed in an incubator and kept at a temperature of  $97^{\circ}$  F. for about 24 hours, at the end of which time an extensive growth of bacteria (if any be present) will be noticed.

2. Our next step will be to isolate in pure culture the various germs which have grown out upon the agar-agar tube in No. 1. This pure culture is obtained by inoculating from the original agar-agar tube, a tube of nutrient bouillon. From this bouillon tube we now inoculate with 2 drops of the nutrient bouillon. 2 sterile agar-agar tubes, the one from the This agar-agar should be melted and other. cooled down to a temperature of 113° F. prior to inoculation with the nutrient bouillon culture. After the agar-agar has been inoculated, it is poured out into flat Petri dishes, in order to enlarge the surface and separate the colo-nies which will subsequently develop. These Petri dishes are then placed in the incubator at a temperature of 97° F. (if we use agar-agar as plate media), of 68° F. (if we use plain gelatin) and kept for 24 hours. At the end of this time we notice separate colonies developed on the surface or in the substance of the culture medium.

3. The next step in the examination is the inoculation, on to a new sterile agar-agar tube, of a specimen from each of the varying colonies developed on the agar-agar plate. This is then incubated, and we have as the result a pure culture of each separate organism obtained from the original inoculation.

4. The next step consists in cultivating the germ artificially upon the various laboratory media. This is done by inoculating with a specimen from our pure culture each of the media in turn, and subjecting them to incubation for 24 hours.

5. Having examined the cultural peculiarities of the microbe, we examine the germ itself in microscopic section. For this purpose we use both stained preparations and the unstained hanging drop. The common laboratory staining agents are the aniline coloring agents such as carbol fuchsin, methylene blue, gentian violet, etc.

6. Our final step in the identification of a bacterium is the inoculation of an animal with a pure culture of the germ under observation. The casual development must be noted with regularity and precision; symptoms must be studied carefully, and if we succeed in producing the disease, with which we know or suspect the original person or animal to have died, we have positive evidence that we have isolated, cultivated, and inoculated the germ causing the original disease.

These are the successive steps in the study of a microbe, and by this method Koch, its promulgator, succeeded in proving that the *Bacillus Tuberculosis* was the specific causal agent in the disease tuberculosis. Numerous infective diseases exist, for which the special causal agent has, as yet, not been discovered; but just as soon as we can start with a disease and by successive steps proceed to the production of the same disease in a susceptible animal, then can we say that the specific causal agent for that disease has been discovered.

These are the general principles underlying the study of bacteria as a whole, but certain specific cases must be considered in which the technique, although it may be carried out in this way, is generally altered to suit the conditions. The consideration of specific bacteriology will be based on the work done in the Laboratory of the Department of Health of Chicago. In this laboratory examinations are made of water (as regards its typhoid tendencies), of suspected diphtheretic cases, of cases of supposed tuberculosis, of cases suspected to be cholera in times of epidemic, and of many other cases coming under the notice of this department in its effort to insure the best general health possible.

In examination cases of supposed tuberculosis of lungs (consumption), a specimen of sputum is obtained from the patient to be examined. One of the white cheesy masses found in it is selected for the future examination. A portion of this mass is placed upon a clean cover glass (a very thin glass section), and is spread out over the surface of this glass in as fine a film as possible. This film is allowed to dry in the air and is then passed three or four times through a flame in order to fix it to the

glass by coagulating the albumen. Having dried and fixed the film, the staining agent (Ziehl's carbol-fuchsin solution) is placed, drop by drop, upon the film. The solution is now heated to boiling several times, more being added as evaporation takes place; and is then washed off with a five-per-cent. solution of sulphuric acid, after which it is treated with ninety-five per cent. alcohol and water until the color entirely disappears. We now place upon the color slip a solution of methylene blue, and allow it to remain unheated about two minutes. This blue solution is then washed off in water, and the preparation is then ready to be mounted and examined microscopically. The peculiarity of this method consists in the fact that while all the bacteria present in the original specimen of sputum are stained.by the red carbol-fuchsin solution, all but the bacillus tuberculosis part with their color upon the subsequent treatment with sulphuric acid and alcohol. On adding the methylene blue the germs, decolorized by acid and alcohol, will take up the blue color, and our microscopical picture will be a very beautiful contrast of red and blue coloration. The bacillus tuberculosis, if present, appears as a bright red, while all else will appear blue. This is a posi-tive sign of tuberculosis. The only germs which have this peculiar reaction are, besides the one already discussed the Smegma bacillus, the bacillus of syphilis, and the bacillus of leprosy. Certain peculiarities are found in their reactions which enable us, by staining process and by knowing the source of the specimen, to substantiate a diagnosis of tuberculosis.

Examination for the bacillus of Typhoid Fever (water analysis in general). It is very rarely that the Bacillus Typhosis itself is found in bacteriological examination of water, but as there are present in the normal intestine of man certain bacteria which can be recognized readily by examination, their presence will prove the contamination of water by intestinal contents, and as such the water can be considered an object of suspicion and as a possible source of typhoid contagion. We first obtain the specimen of water, being careful to avoid contamination from any source other than the one under question. We make plate cultures of specimens of this water, using 1, 2, 3, 5, or 10 drops of the water in each plate. Duplicate plates are to be made, one upon gelatin, to be kept at room temperature, and the other upon agar-agar, to be kept in the incubator at 97° F. We then note the number of colonies by certain counting methods, 100 to the cubic centimeter of water being a safe limit. As few bacteria grow at a temperature of 97° F., if we obtain any growth on the agar-agar plates we can be reasonably certain that some polluting germ is present. However, this is by no means certain. The growth should be studied in all its cultural peculiarities, should be inoculated into animals, and all the general bacteriologic principles applied to it. In the case of the Bacillus Typhosis and its co-habitator, the Bacillus Coli Communis, we can get no results upon animals, as none have been found susceptible



#### Bacteria

to their action. A solution known as Parietti's fluid (a mixture of hydrochloric acid and alcohol) is used as a method of diagnosing pollution by germs belonging to group of Coli Communis. By this method we inoculate a tube with the germ, and then add a few drops of this Parietti's fluid. If we get no growth, we can be sure there are none of the color group present; if a growth is observed, we can be tolerably certain of the presence of some member of this group. Hence this is a negative test. We will not enter into the cultural peculiarities and methods of recognizing the Bacillus Coli Communis, and Bacillus Typhosis; suffice it to say that by methods pursued, contamination by intestinal contents can be noted both bacteriologically and chemically by presence of chlo-rides, nitrates, and nitrites. Contamination by Asiatic cholera germs can be recognized by cultural peculiarities and by inoculation experi-ments. Typhoid Fever germs can be recognized in the urine and feces of a typhoid patient about the tenth day by ordinary methods. A comparatively late method of diagnosis of typhoid fever by bacteriological methods is found in the Widol method. This consists in the addition to the blood of the suspected typhoid patient of a few drops of fresh bouillon culture of typhoid bacilli. If the patient has typhoid fever we will notice, on examining the specimen in the hanging drop under the microscope. that the actively motile typhoid germs are beginning to clump and to lose their motion, until finally they become perfectly passive. The scientific value of this method has as yet not been definitely settled by statistics, but everything seems to point toward its great usefulness as a diagnostic agent. The bacteriological value of typhoid examinations can hardly be overestimated, as contamination may come through air, water, milk, soil, and there is reported a remarkable case of an epidemic of typhoid fever arising from consumption of oysters fattened in brackish water.

Examination of throat in cases of supposed diphtheria. A scraping is made (from one of the whitish plaques on the surface of the mucous membrane of the throat) with a cotton swab. This swab is then rubbed over the surface of a sterile tube or box of Loeffler's bloodserum mixture. It is then to be placed in an incubator or, in the absence of such a contrivance, the test tube may be fastened into the axillary space of the patient and left for 24 hours. At the end of this time the growth which appears on the surface may be examined microscopically. A film of the growth is made on a cover glass in the ordinary way and is then stained for two minutes with a solu-This solution is tion of methylene blue. washed off in water, and the specimen is then mounted and examined. The diplitheria bacillus, if present, presents a peculiar and characteristic appearance. Various bizarre forms, such as club-shaped, dumb-bell, lanceshaped, alternately stained and unstained segments, etc., are noticed so that the germ is easily recognized by its peculiarly characteristic segmentation in staining.

Numerous other examinations could be mentioned, but it is not the purpose of this article to deal completely with the subject. It is sufficient to state that the work done in the Chicago Laboratory is more important than it appears, as it is here that the daily examination of the water supply of the city is made, and it is here that the probable rise and decline of epidemics are noted. It is important to remember that to a more intimate acquaintance with the biological activities of the unicellular vegetable micro-organisms, modern hygiene owes much of its value, and our knowledge of infectious diseases has reached the position it now occupies.

The study of bacteriology may be said to have had its beginning with the observations of Leeuwenhock in the year 1675. In this year he published the fact that he had seen, by means of a lens of his own construction, living motile animalcules in a drop of rain water. Extending his work to the examination of sea water, well water, contents of the intestinal canal of frogs, birds, etc., he found objects that differentiated themselves, the one from the other, by size, shape, and peculiarity of movement. From a study of his work there can be no doubt that he had discovered the bodies now recognized as bacteria. А universal belief in the causal relation of these animalcules to disease arose, and in conse-quence there was developed a "germ mania." Following this line scientists continued to work, and we find, through the researches of Pasteur, of Pollender, of Davaine and others, the old doctrine of *Contagium animatum* re-ceiving attention. The conclusion necessarily drawn from the work as to the origin of these bodies, is that omne vivum ex vivo. The work of Rindfleisch, Klebs, Orth, Eberth, Koch, and others, shows a gradual advance along scientific lines, so that with Koch in 1881, we have our foundation stone of bacteriology solidly laid. Koch proved in that year that distinct varieties of infection, as evidenced by anatomical changes, are due in many cases to the activities of particular specific organisms, and that by proper methods it is possible to isolate these organisms, in pure culture, to cultivate them indefinitely, to reproduce the conditions by inoculation of these pure cultures into susceptible animals and by continuous inoculation from an infected to a healthy animal to continue the R. W. WEBSTER. disease at will.

**Bactria'na** (or Bactria), a country of ancient Asia, south of the Oxus and reaching to the west of the Hindu Kush. It is often regarded as the original home of the Indo-European races. A Græco-Bactrian kingdom flourished about the third century **B**. c., but its history is obscure.

**Ba'cup**, a borough of England, in Lancashire, 18 mi. n. of Manchester. The chief manufacturing establishments are connected with cotton spinning and power-loom weaving; there are also iron works, Turkey-red dyeing works, and in the neighborhood numerous coalpits and immense stone quarries. Pop. 23, 498.

**Badajoz** (bà-dà-hōth') (anc. Pax Augusta), the fortified capital of the Spanish province of Badajoz. Pop. 481,508. During the Peninsular War, Badajoz was besieged by Marshal Soult, and taken in March, 1811. It was twice attempted by the English, on May 5 and 29, 1811, and was besieged by Wellington on March 16, and taken April 6, 1812. Pop. town, 27,270.

**Badakshan'**, a territory of Central Asia, tributary to the Ameer of Afghanistan. The chief town is Faizabad. The inhabitants profess Mohammedanism. Pop. 500,000.

**Badeau**, ADAM, American soldier, b. 1831, in New York. He served on General Grant's staff and retired with a brigadier general's brevet in the regular army. From 1869 to 1881 he was secretary of legation and consul general at London, and accompanied General Grant on his trip round the world (1877-78). He published Mültary History of Ulysses S. Grant (1807-81) and Grant in Peace (1886).

Baden (bä'den), GRAND-DUCHY OF, one of the more important states of the German Empire. It is divided into four districts: Constance, Freiburg, Karlsruhe, and Mannheim; has an area of 5,824 sq. mi., and a pop. of 1,601,255. It is mountainous, being traversed to a considerable extent by the lofty plateau of the Schwarzwald or Black Forest, which attains its highest point in the Feldberg (4,904 ft.). The hilly parts, especially in the east, are cold and have a long winter, while the valley of the Rhine enjoys the finest climate of Germany. The principal minerals worked are coal, salt, iron, zinc, and nickel. The number of mineral springs is remarkably great, and of these not a few are of great celebrity. The vegetation is peculiarly rich, and there are magnificent forests. The cereals comprise wheat, oats, barley, and rye. Potatoes, hemp, tobacco, wine, and sugar-beet are largely pro-Several of the wines, both white and k in the first class. Baden has long duced. red, rank in the first class. been famous for its fruits also. Of the total area 42 per cent. is under cultivation, 37 per cent. under forest, and 17 per cent. under meadows and pastures. The manufactures are important. Among them are textiles, tobacco and cigars, chemicals, machinery, pottery ware, jewelry (especially at Pforzheim), wooden clocks, confined chiefly to the districts of the Black Forest, musical boxes and other musical toys. The capital is Carlsruhe, about 5 mi. from the Rhine; the other chief towns are Mannheim, Freiburg-im-Breisgau, with a Roman Catholic university; Baden and Heidelberg. Baden has warm mineral springs, which were known and used in the time of the Romans. Heidelberg has a university (Protestant), founded in 1386, the oldest in the present German Empire. The railways have a length of 850 mi., and are nearly all state property. In the time of the Roman Empire southern Baden belonged to the Roman\_province of Rhætia. Under the old German Empire it was a margravate, which in 1533 was divided into Baden-Baden and Baden-Durlach, but reunited in 1771. The title of grand duke was conferred by Napoleon in 1806, and in the same year Baden was extended to its present limits. In 1870 Baden took an active part in the Franco-Prussian war, and became a member of the German Empire, Nov. 15, 1871. The executive power is vested in the grand duke, the legislative in a house of legislature, consisting of an upper and lower chamber. The revenue and expenditure are each usually about \$10,000,000.

**Baden** (or Baden-Baden, to distinguish it from other towns of the same name; German, *Bad*, a bath), a town and watering-place, Grand-duchy of Baden, 18 mi. s.s.w. Carlsruhe, built in the form of an amphitheater on a spur of the Black Forest. Baden has been celebrated from the remotest antiquity for its thermal baths. It has many good buildings, and a castle, the summer residence of the grand-duke. Pop. 13,884,

**Baden**, a town of Austria, 15 mi. s.w. of Vienna. It has numerous hot sulphurous springs, used both for bathing and drinking, and very much frequented. Pop. 11,262. It is generally known as Baden bei Wein.

**Baden**, a small town of Switzerland, canton Aargau, celebrated for its hot sulphurous baths, which attract many visitors. Pop. 4,020.

**Badger** (baj'er), a plantigrade, carnivorous mammal, allied both to the bears and to the weasels, of a clumsy make, with short, thick legs, and long claws on the forefeet. The The common badger (Melee-vulgaris) is as large as a middling sized dog, but much lower on the legs, with a flatter and broader body, very thick, tough hide, and long, coarse hair. It inhabits the north of Europe, Asia, and America, burrows, is indolent and sleepy, feeds by night on vegetables, small quadru-peds, etc. Its fiesh may be eaten, and its hair is used for artists' brushes in painting. The American badger belongs to a separate genus. Badger baiting, or drawing the badger, was a barbarous sport formerly practised, generally as an attraction to public-houses of the lowest sort. A badger was put in a barrel, and one or more dogs were put in to drag him out. When this was effected he was returned to his barrel, to be similarly assailed by a fresh set. The badger usually made a most determined and savage resistance.

**Badrinath** (-ät'), a peak of the main Himalayan range, in Garhwál District, Northwestern Provinces, India, 23,210 ft. above the sea. On one of its shoulders at an elevation of 10,400 ft. stands a noted temple of Vishnu, which some years attracts as many as 50,000 pilgrims.

**Baffin**, WILLIAM (1584-1622), an English navigator, famous for his discoveries in the Arctic regions; in 1616 ascertained the limits of Baffin's Bay which is on the n.e. coast of North America between Greenland and the islands that lie on the n. of the continent. He was killed at the siege of Ormuz, in the East Indies.

**Bagatelle**', a game played on a long, flat board covered with cloth like a billiard-table, with spherical balls and a cue or mace. At the end of the board are nine cups or sockets of just sufficient size to receive the balls. Nine balls are used, generally one black, four white, and four red, the distinction between white and red being made only for the sake of variety.

**Bagdad'**, capital of a Turkish pashalic of the same name (70,000 sq. mi., 1,000,000 inhabitants), in the southern part of Mesopotamia (now Irak Arabi). The greater part of it lies on the eastern bank of the Tigris which is crossed by a bridge of boats; old Bagdad was on the western bank of the river. Manufactures: leather, silks, cottous, woolens, carpets, etc. Steamers ply on the river between Bagdad and Bassorah, and the town exports wheat, dates, galls, gum, mohair, carpets, etc., to Europe. Bagdad is inhabited by Turks, Arabs, Persians, Armenians, Jews, etc., and a small number of Europeans. Est. pop. over 100,000. The Turks compose three fourths of the whole population. The city has been frequently visited by the plague, and in 1831 was nearly devastated. Bagdad was founded in 762, and is the scene of many of the tales of the *Arabian Nights*.

**Bagehot,** WALTER (1820-1877), an English economist. For seventeen years he edited the London *Economist*. He was a recognized authority on economic questions and wrote many treatises on banking, the coinage and the history of the money market.

**Baghelkand**, a tract of country in central India, occupied by a collection of native states (Rewah being the chief), under the governor general's agent for central India. Area 11,323 sq. mi.; pop. 1,512,595.

**Bagirmi** (bà-gir'mē) (or Baghermi), a Mohammedan negro state in Central Africa. situated between Bornu and Waday, to the s.

of lake Tchad. It is mostly a plain; has an area of about 56,000 sq. mi. and about 1,-500,000 inhabitants. The people are industrious, and have attained to a considerable pitch of civilization.

Bagpipe, 8 musical windinstrument of very great antiquity, having been used among the ancientGreeks, and being ล favorite instrument over Europe generally in the fifteenth



century. It still continues in use among the country people of Poland, Italy, the south of France, and in Scotland and Ireland. Though now often regarded as the national instrument of Scotland, especially Celtic Scotland, it is only Scottish by adoption, being introduced into that country from England. It consists of a leathern bag, which receives the air from the mouth, or from bellows; and of pipes, into which the air is pressed from the bag by the performer's elbow. In the common or Highland form one pipe plays the melody; of the three others two are in unison with the lowest A of the chanter, and the third and longest an octave lower, the sound being produced by means of reeds.

Baha'ma Islands (or Lucayos), a group of islands in the West Indies, forming a colony belonging to Britain, lying n. e. of Cuba, and s. e. of the coast of Florida. The principal islands are Grand Bahama, Great and Little Abaco, Andros Islands. New Providence, Eleuthera, San Salvador, Great Exuma, Watling Is-land, Long Island, Crooked Island, Acklin Is-land, Mariguana Island, Great Inagua. Of the whole group about twenty are inhabited, the most populous being New Providence, which contains the capital, Nassau, the largest being Andros. Total area 5,450 sq. mi. The soil is a thin but rich vegetable mold, and the principal product is pineapples, which form the most important export. Other fruits are also grown, with cotton, sugar, maize, yams, groundnuts, cocoanuts, etc. Sponges are obtained in large quantity and are exported. The currency is English, but American coins circulate freely. The islands are a favorite winter resort for those afflicted with pulmo-nary diseases. Watling Island is now by best authorities believed to be same as Guanahani, the land first touched on by Columbus (Oct. 12, The 1492) on his first voyage of discovery. first British settlement was made on New Providence toward the close of the seven-teenth century. A number of American Tories settled in the islands after the Revolution. Pop. 47,565, including 14,000 whites.

**Bahi'a** (bà-ē'à) formerly San Salvador, a town of Brazil, on the Bay of All Saints, province of Bahia. It was founded in 1549, and is the oldest town in Brazil, of which it was capital until 1763. In 1874 it was placed in telegraphic communication with Europe. The harbor is one of the best in S. A.; and the trade, chiefly in sugar, cotton, coffee, tobacco, hides, piassava, and tapioca, is very extensive. Pop. 80,000. The province (area 164,649 sq. mi.; pop. 1,821,089) has much fertile land, both along the coast and in the interior.

Bahia Honda (Port. "deep bay"), a seaport of northern Cuba, 60 mi. w. s. w. of Havana. Pop. 4,823.

**Bahrein** (bä'rīn) **Islands**, a group of islands in the Persian Gulf, in an indentation on the Arabian coast. The principal island usually called Bahrein, is about 27 mi. in length and 10 in breadth. The principal town is Menamah (or Manama); pop. 3,500. The Bahrein Islands are chiefly noted for their pearl fisheries.

which were known to the ancients, and which employ in the season about 400 boats with from 8 to 20 men in each. Total pop. est. 40,000.

**Baise** (bi'é), an ancient Roman wateringplace on the coast of Campania, 10 mi. w. of Naples. Many of the wealthy Romans had country houses at Baise, which Horace preferred to all other places. It became notorious for the vicious lives of its inhabitants. Ruins of temples, baths, and villas still attract the attention of archeeologists.

**Baikal** (bi'kål), a large fresh-water lake in Eastern Siberia. Area 14,000 sq. mi. It is surrounded by rugged and lofty mountains; contains seals, and many fish, particularly salmon, sturgeon, and pike. Its greatest depth is over 4,000 ft., and the seal and sturgeon fisheries are important industries. It is frozen over in winter.

**Balley,** JAMES MONTGOMERY (1841—), American journalist, b. in Albany, N. Y., edited the *Danbury News*, to which he contributed numerous articles which for a time had great vogue. He was known by his signature as "The Danbury Newsman."

**Balley**, PHILIP JAMES, English poet, b. at Basford, Nottingham, 1816. His most remarkable poem, *Festus*, was published in 1839. In 1877 it had reached a tenth edition in England and had been even more read and admired in America.

**Baillie**, JOANNA (1762-1851), a Scottish authoress, b. at Bothwell, Lanarkshire. She wrote several series of plays. Her only plays performed on the stage were a tragedy entitled *The Family Legend*, brought out at EdinBurgh under the patronage of Sir Walter Scott; and *De Montfort*, brought out by John Kemble.

**Bailly**, JEAN SYLVAIN (1736–1793), first an artist, then astronomer, was b. in Paris. Chosen president of the National Assembly, 1789, and mayor of Paris, July 15, he labored with energy and assiduity to keep the citizens from starvation and revolt. Discords showed themselves in the Assembly and throughout the nation. Finally it became his duty to order the National Guard to fire on the insurgent rabble in the Champs-de-Mars. In November, 1791, he resigned his office. When the Revolution grew more furious and hysterical, he was arrested and guillotined.

**Bally,** FRANCIS (1774–1844), English astronomer. He published Tables for the Purchasing and Renewing of Leases, The Doctrine of Interest and Annuities, The Doctrine of Life Annuities and Assurances, and an epitome of universal history. On retiring from business in 1825, he turned his attention to astronomy, and became one of the founders of the Astronomical Society.

**Baily's Beads**, a phenomenon attending eclipses of the sun, the unobscured edge of which appears discontinuous and broken immediately before and after the moment of complete obscuration. It is classed as an effect of irradiation.

Bain, ALEXANDER, a Scotch writer on mental philosophy and education, was b. at Aberdeen in 1818. He was educated at Marischal College, Aberdeen; subsequently held official posts in London; and in 1860 was appointed professor of logic and English in Aberdeen University, a post which he held till his resignation in 1881.

Bainbridge, WILLIAM (1774-1833), American naval officer. When the U. S. navy was reorganized in 1798 he was appointed lieutenant commandant. In 1800 he commanded the frigate *George Washington*, which carried to Algiers the commercial tribute then levied by the dey of that country. In 1801 Bainbridge was captain of the Essex, which cruised in the Mediterranean. In 1803 in the U.S. war with Tripoli, he commanded the frigate Philadelphia under Commodore Preble, and while chasing a blockade-runner his vessel grounded on a reef and was scuttled and surrendered. The captain and his 315 men were kept as prisoners until the peace in June, 1805. He sailed from Boston, 1812, in command of a squadron comprising the Constitution, Essex, and Hornet. On December 26, off the coast of Brazil, he captured the British frigate Java, of forty-nine guns, for which achievement Congress distributed among the crew \$50,000 as prize money, voted the commodore a gold medal, and to each of his officers a silver one. In 1815 Bainbridge commanded the Mediterranean squadron.

**Bairam** (bi'ram), the Easter of the Mohammedans, which follows immediately after the Ramadan or Lent (a month of fasting), and lasts three days. Sixty days after this first great Bairam begins the lesser Bairam. They are the only two feasts prescribed by the Mohammedan religion.

**Baird,** HENRY CAREY, b. 1825, near Philadelphia. He became a publisher, and has written several works on economic subjects and the currency. He joined the Greenback party in 1875.

**Baird,** SPENCER FULLERTON (1823-1887), American naturalist. He was long assistant secretary, and latterly secretary of the Smithsonian Institution, Washington, and was also chief government commissioner of fish and fisheries. He wrote much on natural history, his chief works being, *The Birds of North America* (in conjunction with John Cassin); *The Mammals of North America; Review of American Birds in the Smithsonian Institution;* and (with Messrs. Brewer and Ridgeway) *History of North American Birds*.

**Baireuth** (bi'roit), a town of Bavaria, on the Red Main, 41 mi. n.e. of Nürnberg. The principal edifices, the old and the new palace, are the opera house, the gymnasium, and the national theater. Industries: cotton spinning, sugar refining, musical instruments, sewing machines, leather, brewing, etc. Pop. 24,556.

**Baja** (bü'yà), a market town of Hungary, district of Bacs, on the Danube, with a trade in grain and wine, and a large annual hog fair. Pop. 19.241.

**Bajazet** (bå-yå-zet') (or Bayasid I) (1389– 1409), Turkish emperor, who, in 1389, having strangled his brother Jacob, succeeded his father Murad (or Amurath). From the rapidity of his conquests he received the name of Ilderim, the Lightning. In three years he subjected Bulgaria, part of Servia, Macedonia, Thessaly, and the states of Asia Minor, and besieged Constantinople for ten years, defeating Sigismund and the allied Hungarians, Poles, and French, in 1395. The attack of Timur (Tamerlane) on Natolia, in 1400, saved the Greek Empire, Bajazet being defeated and taken prisoner by him near Ancyra, Galatia, 1402.

**Bajazet II** (1447-1512), sultan of the Turks. He inoreased the Turkish Empire by conquests on the n.w. and in the e., and ravaged the coasts of the Christian states on the Mediterranean, to revenge the expulsion of the Moors from Spain.

**Baker**, SIR SAMUEL WHITE (1821-1893), a distinguished English traveler. In 1861 began his African travels, which lasted several years, in the Upper Nile regions, and resulted, among other discoveries, in that of Albert Nyanza Lake in 1864, and of the exit of the White Nile from it. In Africa he encountered Speke and Grant after their discovery of the Victoria Nyanza. In 1869 he returned to Africa as head of an expedition sent by the khedive of Egypt to annex and open up to trade a large part of the newly explored country, being raised to the dignity of pasha. He returned in 1873, having finished his work, and was succeeded by General Gordon. His writings include: *The Rifte and the Hound in Ceylon; Eight Years' Wanderings in Ceylon; The Albert Nyanza, etc.; The Nile Tributaries of Abyssinia; Ismailia; A Narrative of the Expedition to Central Africa; Cyprus as I Save It;* and *Cast up by the Sea.* 

Narrative of the Expedition to Central Africa; Cyprus as I Saw It; and Cast up by the Sea. **Bake' well**, ROBERT (1726 - 1795), a famous English agriculturist, b. at Dishley, Leicestershire. He devoted himself to improving the breeding of cattle and sheep, aiming principally at producing the greatest weight of carcass with the smallest amount of feeding, and is to be regarded as the initiator of the system of scientific breeding.

Baking Powder, a mixture of bicarbonate of soda and tartaric acid, usually with some flour added. The water of the dough causes the liberation of carbonic acid, which makes the bread "rise." The process of manufacturing baking powder has grown to be an enor-mous enterprise in the U.S. The acid ordinarily used in baking powder is cream of tartar. This is obtained from lees of wine and argals, both of which are by-products of the manufac-ture of wine. This is obtained after the wine has been allowed to stand in the cellar and is the fine substance which settles to the bottom in the casks. The wine is drawn off, leaving this pinkish mass known as lees of wine. contains about 25 per cent. of cream of tartar. Formerly the lees were sold for fertilizers and the argals were burned for lampblack, but since baking powder has come into general use the demand for both has become great. These products are brought to the factory from France, Italy, and Spain, and after being crushed to a fine powder, are boiled in huge

copper tanks. As the solution cools, the cream of tartar crystallizes on the side of the tank and the other impurities either remain in the solution or form a precipitate in the bottom. The crystals, which are of a faded brown color, are scraped off, redissolved, and discolored by passing through a filter of animal coal. The crystals, after this process, are white and almost perfectly pure and ready for use in the baking powder manufactory. With the soda and starch it is then brought to the chemical laboratory and analyzed. The process of manufacturing begins on the top floor, where the crystals of cream of tartar are fed into the hopper of a grinding machine from which it comes out as fine white powder. It is sifted through a number of bolting screens, then barreled and placed along with the soda and starch. In the floor are three trapdoors, one for the cream of tartar, one for the soda, and one for the starch. Below the floor are three bins, which narrow to funnels, the mouths of which are covered with draw slides. Under each spout is a weighing scale over which runs a truck track, which continues on around over two traps in the floor. The truck is put under the cream of tartar spout and filled with just the proper amount and is then dumped into a bin below, then a certain amount of soda and starch is added in the same manner. The starch is added as a filler to separate the particles of cream of tartar and soda and aids in preventing a chemical combination until water is added. The ingredients are then thoroughly mixed and samples are placed in small boxes and sent to the laboratory for analysis. The powder is then put in boxes, labeled and ready for the market. Instead of cream of tartar, alum and alum-ammonia are extensively used as the acid element. They are less expensive but the law in several states prohibits their use. Ammonia may be de-tected in baking powder by mixing a portion with water and boiling thoroughly for a few minutes. If there is ammonia it may be detected by the smell in the rising steam. Alum may be detected by placing some of the pow-der in a glass of cold water. If there is no effervescence, alum powder is present.

**Baku** (bä-kö'), a Russian port on the western shore of the Caspian. The naphtha or petroleum springs of Baku have long been known; and the Field of Fire, so called from emitting inflammable gases, has long been a place of pilgrimage with the Guebres or Fire-worshipers. About 400 oil wells are in operation. Some of the wells have had such an outflow of oil as to be unmanageable. Baku is the station of the Caspian fleet, is strongly fortified, and has a large shipping trade: Pop. 107.761.

and has a large shipping trade: Pop. 107,761. Bakunin, MICHAEL (1814-1878), the founder of Nihilism, born of a noble Russian family, became associated with a band of students who studied German philosophy. Among these were Herzen, Turgenieff, the novelist, and Belinski. He went to Berlin in 1841, was expelled from that city and from various continental capitals as a revolutionist, and participated in the insurrection at Dresden in 1848.

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He spent eight years in prisons in Austria and Russia, was banished to Siberia in 1856, and escaped from there in an American vessel. He joined the staff of Herzen's revolutionary organ, the Kolokol, in London, but his ideas were too far advanced for his associates. He quarreled with Karl Marx and Mazzini. He went to Switzerland, where he preached Nihilism, and died suddenly at Berne. He demanded the entire abolition of the state as a state, the absolute equalization of individuals, and the extirpation of hereditary rights and of religion, his conception of the next stage of social progress being purely negative and annihilatory.

**Balaam** (bā'lam), a heathen seer, invited by Balak, king of Moab, to curse the Israelites, but compelled by miracle to bless them instead (Numbers 22-24). In another account he is represented as aiding in the perversion of the Israelites to the worship of Baal, and as being, therefore, slain in the Midianitish war (Numbers 31; Joshua 13).

**Balaklava** (ba-là-klä'và), a small seaport in the Crimea, 8 mi. s. s. e. Sebastopol. In the Crimean War it was captured by the British, and a battle took place here October, 1854, wherein the Russians were defeated. In this contest occurred the "Charge of the Light Brigade" rendered famous by Tennyson's poem.

Balance, an instrument employed for ascertaining and determining the quantity of any substance equal to a given weight. Balances are of various forms; in that most commonly used a horizontal beam rests so as to turn easily upon a certain point known as the center of motion. From the extremities of the beam, called the centers of suspension, hang the scales, and a slender metal tongue midway between them, and directly over the center of motion, indicates when the beam is level. The characteristics of a good balance are: 1, that the beam should rest in a horizontal position when the scales are either empty or loaded with equal weights; 2, that a very small addition of weight put into either scale should cause the beam to deviate from the level, which property is denominated the sensibility of the balance; 3, that when the beam is deflected from the horizontal position by inequality of the weights in the scales, it should have a tendency speedily to restore itself and come to rest in the level, which property is called the *stability* of the balance. To secure these qualities the arms of the beam should be exactly similar, equal in weight and length, and as long as possible; the centers of gravity and suspension should be in one straight line, and the center of motion immediately above the center of gravity; and the center of motion and the centers of suspension should cause as little friction as possible. The center of motion ought to be a knife-edge; and if the balance requires to be very delicate, the centers of suspension ought to be knife-edges also. For purposes of accuracy, balances have occasionally means of raising or depressing the center of gravity, of regulating the length of the arms, etc., and the whole apparatus is not unfrequently enclosed in a glass case, to prevent the heat from expanding the arms unequally, or currents of air from disturbing the equilibrium.

Of the other forms of balance, the Roman balance, called *steelyard*, consists of a lever moving freely upon a suspended fulcrum, the shorter arm of the lever having a scale or pan attached to it, and the longer arm, along which slides a weight, being graduated to indicate quantities. It is com-monly used for weighing loaded carts, for luggage at railway stations, etc. A variety of this, the Danish balance, has the weight fixed at the end of the lever, the fulcrum being movable along the graduated index. The spring-balance shows the weight of articles by the extent to which they draw out or compress a spiral spring. It is of service where a high degree of exactness is not required, and finds application in the dynamometer for measuring the force of machinery. An extremely ingenious balance, used in the mint and the Bank of England for weighing "blanks" and sovereigns, distributes them automatically into three compartments according as they are light, heavy, or the exact weight.

Balance of Power, a political principle which first came to be recognized in modern Europe in the sixteenth century, though it appears to have been also acted on by the Greeks in ancient times in preserving the relations between their different states. The relations between their different states. object in maintaining the balance of power is to secure the general independence of nations as a whole, by preventing the aggressive attempts of individual states to extend their territory and sway at the expense of weaker countries. The first European monarch whose ambitious designs induced a combination of other states to counteract them, was the Emperor Charles V; similar coalitions being formed in the end of the seventeenth century, when the ambition of Louis XIV excited the fears of Europe, and a century later against the exorbitant power and ag-gressive schemes of the first Napoleon. More recently still we have the instance of the Crimean War, entered into to check the ambition of Russia. Of late years there has been a marked tendency among British politicians to decry and impugn the principle of the balance of power, as calculated only to propagate a system of mutual hostility, and retard the cause of progress, by the expenditure both of money and life thus occasioned. There can be no doubt, however, that to the carrying out of this principle the independence of some of the smaller and weaker European states is fairly attributable.

**Bal'aton** (or Plattensee), a lake of Hungary, 55 mi. s.w. of Pesth; length 50 mi.; breadth, 3 to 10 mi.; area about 390 sq. mi. Of its thirty-two feeders the Szala is the largest, and the lake communicates with the Danube by the rivers Sio and Sarviz. It abounds with a species of perch.

**Baibo'a**, VASCO NUNEZ DE (1475-1517), one of the early Spanish adventurers in the New

World. Having dissipated his fortune, he came to America, and was at Darien with the expedition of Francisco de Enciso in 1510. An insurrection placed him at the head of the colony, but rumors of a western ocean and of the wealth of Peru led him to cross the isthmus. On Sept. 25, 1513, he saw for the first time the Pacific, and after annexing it to Spain, and acquiring information about Peru, returned to Darien. Here he found himself supplanted by a new governor, Pedrarias Davila, with much consequent grievance on the one side, and much jealousy on the other. Balboa submitted, however, and in the following year was appointed viceroy of the South Sea. Davila was apparently reconciled to him, and gave him his daughter in marriage, but shortly after had him beheaded on a charge of intent to rebel. Pizarro, who afterward completed the discovery of Peru, served under Balboa.

**Balch,** GEORGE B., b. 1821, in Tennessee. He entered the navy in 1837; was many years on foreign service and participated in the attack on Vera Cruz. He served in the South Atlantic squadron during the Civil War and commanded the *Pawnee*. He became commodore, 1872, rear admiral, 1878, and was superintendent of the naval academy until 1879. He was placed on the retired list in 1883.

**Balder** (or Baldur), a Scandinavian divinity, represented as the son of Odin and Frigga, beautiful, wise, amiable, and beloved by all the gods. He is believed to be a personification of the brightness and beneficence of the sun.

Baidness, loss of the hair, complete or partial, usually the latter, and due to various causes. Most commonly it results as one of the changes belonging to old age, due to wasting of the skin, hair sacs, etc. It may occur as a result of some acute disease, or at an unusually early age, without any such cause. In both the latter cases it is due to defective nourishment of the hair, owing to lessened circulation of the blood in the scalp. The best treatment for preventing loss of hair seems to consist in such measures as bathing the head with cold water and drying it by vigorous rubbing with a rough towel and brushing it well with a hard brush. Various stimulating lotions are also recommended, especially those containing cantharides. But probably in most cases senile baldness is unpreventable. When extreme scurfiness of the scalp accompanies loss of the hair an ointment that will clear away the scurf will prove beneficial.

**Baldwin 1** (1172-1206), emperor of Constantinople. His courage and conduct in the fourth crusade led to his unanimous election as Emperor of the East after the capture of Constantinople by the French and Venetians in 1204. Baldwin marched on Adrianople against Greek revolutionists. but was taken prisoner and d. in captivity.

**Baldwin II** (1217-1270), fifth and last Latin emperor of Constantinople. During his minority John de Brienne was regent, but on his assuming the power himself the empire fell to pieces. In 1261 Constantinople was taken, and Baldwin retired to Italy. **Baidwin I,** king of Jerusalem, reigned 1100–18, having assumed the title which his elder brother Godfrey de Bouillon had refused. BALDWIN II, his cousin and successor, reigned from 1118-31. During his reign the reduction of Tyre and institution of the order of Templars took place. BALDWIN III, king of Jerusalem from 1143 to 1162, was son and successor of Foulques of Anjou. He devoted himself to the hopeless task of improving the kingdom and establishing the Christian chivalry in the East.

**Baldwin**, CHARLES H. (1822-1888), b. in New York City. He entered the navy in 1839, became a lieutenant in 1853, commander in 1862, and captain in 1869. He served in the Mexican War, being stationed on the west coast. He was in command of one of the steamers of the mortar flotilla when Farragut's fleet passed forts St. Phillip and Jackson in 1862, and at the attack of Vicksburg in June, 1862.

the attack of Vicksburg in June, 1862. **Baldwin**, HENRY, LL.D. (1779-1844), b. at New Haven, Conn. He was elected to Congress several times from the state of Pennsylvania, and in 1830 was appointed a judge of the Supreme Court of the U.S.

**Baldwin**, MATTHIAS W. (1796–1866), b. in New Jersey. He is given credit for having constructed the first locomotive in America, the "*Ironsides*," and for making several improvements in locomotives.

**Baldwin**, ROGER SHERMAN, LL.D.(1793-1863), an American statesman, b. in New Haven, Conn. He became governor of his native state in 1844, and was sent to the U. S. Senate in 1847, He was associated with J. Q. Adams in the famous Amistad trial in 1841.

Balear'ic Islands, a group of five islands, southeast of Spain, including Majorca, Minorca, Iviza, and Formentera. The popular derivation of the ancient name, Baleares, has reference to the repute of the inhabitants for their skill in slinging, in which they distinguished themselves both in the army of Hannibal, and under the Romans, by whom the islands were annexed in 123 B. c. They were taken by James I, king of Arragon, 1220-34, and constituted a kingdom, which in 1375 was united to Spain. The islands now form a Spanish province, with an area of 1,860 sq. mi., and 312,503 inhabitants.

**Baleen'**, the term applied to the horny plates attached to the palate of the whalebone whales, and which constitute the "whalebone" of commerce. The baleen plates are arranged in a double row on the palate, and depend into the cavity of the mouth of the whale. The length of the largest plates averages from 10 to 14 feet; while in number about 200 plates exist on each side of the mouth. The huge fringe acts as a kind of sieve or strainer in serving to prevent substances of large bulk from gaining access to the throat, and also in entangling the minute forms upon which the whale feeds.

**Balfe,** MICHAEL WILLIAM (1808–1870), a British musician, was b. in Dublin. When only sixteen he conducted the orchestra at Drury Lane Theater. He afterward studied

music in Italy. In 1845 he was made conductor of the Italian Opera, Covent Garden. His principal works are operas. The bestknown are, The Bohemian Girl (1844), and The Rose of Castile (1857). His latest productions were Satanella, The Puritan's Daughter, Blanche de Nevers, and The Sleeping Queen.

Bal' four, RIGHT HON. ARTHUR JAMES, M. P., a noted English statesman of the present day, was b. in 1848, and in 1856, succeeded his father in the estate of Whittinghame, Haddingtonshire. He was educated at Eton and Trinity College, Cambridge, and in 1874 was returned to Parliament as Conservative member for Hetford. Public attention was soon drawn to him by his quickness of perception and readiness in debate, and he has now become one of the most effective speakers in the House. From 1878 to 1880 he was private secretary to his uncle, Lord Salisbury, foreign secretary in Lord Beaconsfield's ministry, and he accompanied that nobleman to the Berlin Congress. On the accession to power of Mr. Gladstone, in 1880, he for a time formed one of Lord Randolph Churchill's "Fourth Party," and in 1882 fiercely assailed the government on the Kilmainham Treaty question. At the election of 1885 he was returned for East Manchester, a seat which he still retains. He was appointed president of the Local Government Board in 1885, secretary for Scotland in 1886. on the death of W. H. Smith, in 1897-91. On the death of W. H. Smith, in 1891, he be-came first lord of the treasury and leader of the House, offices which he held until the resignation of Lord Salisbury in 1892. In 1895 appeared his work, entitled *The Founda*tions of Belief, which excited considerable public attention and interest.

**Balfour,** FRANCIS MAITLAND (1851-1882), brother of the foregoing. He published a work on *Elements of Embryology*, was elected fellow of his college at the age of twenty-three, and fellow of the Royal Society four years later. He was a most promising scientist.

**Balfour',** SIR JAMES, lord president of the Court of Session, and son of Sir Michael Balfour, of Pittendreich, in Fifeshire, was one of the most dubious politicians of the Reformation period in Scotland. He, however, succeeded in achieving considerable personal and professional success, attaining in the end the lord presidentship of the Court of Session. He d. in 1583.

**Balfour**, JOHN HUTTON (1808–1884), a distinguished Scotch botanist. He established the Botanical Society of Edinburgh, was professor of botany in Glasgow University, and a fellow of the Royal Society. He was for thirty years dean of the medical faculty of the University of Edinburgh.

**Baifroosh'** (or Barfurush'), a town, Persia, province of Mazanderan, about 12 mi. from the Caspian, a great emporium of the trade between Persia and Russia. Pop. est. 50,000.

Ba'li, an island of the Indian Archipelago, e. of Java, belonging to Holland; area about 2,260 sq. mi. Principal products: rice, cocoa, coffee, indigo, cotton, etc. It is divided into eight provinces under native rajahs, and forms one colony with Lombok, the united population being 863, 725, of whom 300,000 may belong to Bali.

**Bai'ioi** (or Ballibi), JOHN DE, of Barnard Castle, Northumberland, father of king John Baliol, a great English or Norman baron in the reign of Henry III. In 1263 he laid the foundation of Balliol College, Oxford, which was completed by his widow Devorguila (or Devorgilla). His son, John Baliol, became temporary king of Scotland. He d. 1269.

Bal' iol (1249-1315) (or Balliol), JOHN, king of Scotland. On the death of Margaret, Baliol claimed the vacant throne by virtue of his descent from David, Earl of Huntingdon, brother to William the Lion. Robert Bruce opposed Baliol; but Edward I's decision was in favor of Baliol. Irritated by Edward's harsh exercise of authority, Baliol concluded a treaty with France, then at war with England; but after the defeat at Dunbar he surrendered his crown into the hands of the English monarch. He was sent with his son to the Tower, but in 1297 obtained liberty to retire to his Norman estates, where he died. His son, Edward, in 1332, landed in Fife with an armed force, and having defeated a large army under the regent Mar, got himself crowned king, but was driven

out in three months. **Baik'an** (Arab. "high ridge;" anciently Hæmus. "the wintry or snowy mountains"), the most eastern branch of the great Alpine system of Central Europe, extends from the plain of Sophia to the Black Sea, separating Bulgaria from Rumili, and forming the watershed between the Danube and the Maritza. Tchar-dagh (9,700 ft.) in the w. part, is its highest peak. The B. is crossed by 6 roads, over as many passes, the most important of which is the Porta Trajani, which forms the overland route between Vienna and Constantinople. As a political boundary it divides Bulgaria from Eastern Roumelia.

Baikan Free States: Bulgaria, Eastern Roumelia. Roumania, and Servia.

**Balkash**' (or Balkhash) (bål-*k*åsh'), a salt lake in Russian Central Asia, area 8,500 sq. mi., depth nowhere more than 80 ft.

**Balkfi** (bälk or bäl $\hbar$ ), a city in the north of Afghanistan, in Afghan Turkestan, at one time the emporium of the trade between India, China, and Western Asia. In 1220 It was sacked by Genghis Khan, and again by Timur in the fourteenth century. A new town has risen up an hour's journey n. of the old, the residence of the Afghan governor, with a population of about 25,000.

**Bal'kis**, the Arabian name of the Queen of Sheba who visited Solomon. She is the central figure of innumerable Eastern legends and tales.

**Ball**, Game of. Ball-playing was practised by the ancients, and old and young amused themselves with it. The Phæacian damsels are represented in the Odyssey as playing it to the sound of music, and Horace represents Mæcenas as amusing himself thus in a journey. In the Greek gymnasia, the Roman baths, and in many Roman villas, a *sphæristerium* (a place



appropriated for playing ball) was to be found; the games played being similar to those indulged in at the present day. In the Middle Ages the sport continued very popular both as an indoor and outdoor exercise, and was a favorite court pastime until about the end of the eighteenth century. In England foot-ball and tennis are mentioned at an early date, and a favorite game prior to the English revolution was one in which a mall or mallet was used, hence the name pall-mall for the game and the place where it was played. The most popular modern forms are Crickat, Base ball, Foot ball, Golf, Lawn-tennis, and Polo (which see).

**Ball**, JOHN, an itinerant preacher of the fourteenth century, excommunicated about 1367 for promulgating "errors, schisms, and scandles against the pope, archbishops, bishops, and clergy." He was one of the most active promoters of the popular insurgent spirit which found vent under Wat Tyler in 1381.

**Ball**, SIR ROBERT STAWELL, a British astronomer, was b. in Dublin, July 1, 1840, and studied at Trinity College. In 1865 he was appointed Lord Rosse's astronomer at Parsonstown; in 1873 Professor of Applied Mathematics at the Royal Irish College of Science; and in 1874 Professor of Astronomy at Dublin, aud Astronomer Royal for Ireland. He has published several works on mechanics and astronomy as, The Story of the Hearens, In Starry Realms, and In the High Hearens, besides many articles in various magazines.

Ball, THOMAS (1819 —). American sculptor, born in Charlestown. Mass. He studied in Europe, and in 1865 settled in Florence. Among his works are the equestrian statue of Washington at Boston, the Webster statue in Central Park, New York, and the Emancipation group at Washington, D. C.

Bal'lad, a term loosely applied to various poetic forms of the song type, but in its most definite sense a poem in which a short narrative is subjected to simple lyrical treatment. The ballad is probably one of the earliest forms of rhythmic poetic expression, constituting a species of epic in miniature, out of which by fusion and remolding, larger epics were sometimes shaped. As in the folk-tales, so in the ballads of different nations, the resemblances are sufficiently numerous and close to point to the conclusion that they have often had their first origin in the same primitive folk-lore or popular tales. But in any case, excepting a few modern literary ballads of a subtler kind, they have been the popular expression of the broad human emotions clustering about some strongly outlined incidents of war, love, crime, superstition, or death. It is probable that in the Homeric poems fragments of older ballads are embedded; but the earliest ballads, properly so called, of which we have record were the ballistea or dancing songs of the Romans, of the kind sung in honor of the deeds of Aurelian in the Sarmatic War by a chorus of dancing boys. In their less specialized sense of lyric narratives, their early popularity among the Teutonic race is evidenced by the testimony of Tacitus, of the Gothic historian Jornandes, and the Lombard historian Paulus Diaconus; and many appear to have been written down by order of Charlemagne and used as a means of education. Of the ballads of this period, however, only a general conception can be formed from their traces in conglomerates like the Niebelungenlied; the more artificial productions of the Minnesänger and Meistersänger overlying the more popular ballad until the fifteenth century, when it sprang once more into vigorous A third German ballad period was inilife. tiated by Bürger under the inspiration of the revived interest in the subject shown in Great Britain and the publication of the Percy Reliques; and the movement was sustained by Herder, Schiller, Goethe, Heine, Uhland, and others. The earlier German work is, however, of inferior value to that of Scandinavia, where, though comparatively few manuscripts have survived, and those not more than three or four centuries old, a more perfect oral tradition has rendered it possible to trace the original stock of the twelfth century.

Of the English and Scottish ballads anterior to the thirteenth century there are few traces beyond the indication that they were abundant, if indeed anything can be definitely asserted of them earlier than the fourteenth century. Among the oldest may be placed The Little Guest of Robin Hood, Hugh of Lincoln, Sir Patrick Spens, and the Battle of Otterbourn. In the fifteenth century specimens multiplied rapidly; ballad-making became in the reign of Henry VIII a fashionable amusement, the king himself setting the example; and though in the reign of Elizabeth ballads came into literary disrepute and ballad singers were brought under the law, yet there was no apparent check upon the rate of their produc-tion. Except perhaps in the n. of England and s. of Scotland, there was, however, a marked and increasing tendency to vulgarization as distinct from the preservation of popu-lar qualities. The value of the better ballads was lost sight of in the flood of dull, rhythmless, and frequently scurrilous verse. The modern revival in Britain dates from the publication of Ramsay's Evergreen and Tea-Table Miscellany (1724-27) and of the selection made by Bishop Percy from his seventeenth-century MS. (1765), a revival not more important for its historic interest than for the influence which it has exercised upon all subsequent poetry.

The threefold wave discernible in German, if not in British, ballad history, is equally to be traced in Spain, which alone among the Latinized countries of Europe has songs of equal age and merit with the British historic ballads. The principal difference between them is, that for the most part the Spanish romance is in trochaic, the British ballad in iambic meter. The ballads of the Cid date from about the end of the twelfth and beginning of the thirteenth century; and then followed an interval of more elaborate production, a revival of ballad interest in the sixteenth cen-

tury, a new declension, and finally a modern and still persisting enthusiasm.

The French poetry of this kind never reached any high degree of perfection, the romance, farce, and lyric flourishing at the expense of the ballad proper. Of Italy much the same may be said, though Sicily has supplied a great store of ballads; and nearly all the Portuguese poetry of this kind is to be traced to a Spanish origin. The Russians have lyrico-epic poems, of which some, in old Russian, are excellent, and the Servians are still in the ballad-producing stage of civilization. Modern Greece has also its store of ballads, to which Madame Chenier called attention in the middle of last century. Both in Greece and Russia and in the Pyrenees the old habit of improvising song as an accompaniment to dance still exists.

**Bal'iantyne**, JAMES (1772–1833), the printer of Sir W. Scott's works. Successively a solicitor and a printer in his native town, at Scott's suggestion he removed to Edinburgh, where the high perfection to which he had brought the art of printing, and his connection with Scott, secured him a large trade. His firm was involved in the bankruptcy of Constable & Co., by which Scott's fortunes were wrecked, but Ballantyne was continued by the creditors' trustee in the literary management of the printing house.

Ballantyne, ROBERT M. (1825-1894), a prolific British writer of tales for boys. His experiences acquired in the backwoods of Rupert's Land, among the fur-traders and Red Indians, in the Bell Rock Lighthouse, in a visit to the Cape, have all been utilized in producing sound, wholesome, and interesting tales.

**Ball' arat**, a city and gold field of the colony of Victoria, Australia, 96 mi. w. n. w. of Melbourne. B. was the scene of one of the earliest gold discoveries in Victoria, in June, 1851, and is still the principal gold-producing district of the colony. Quartz mining is now the leading feature of the district, and auriferous reefs are remuneratively worked at a depth of 900 and 1,000 ft. The town of B. consists of two distinct municipalities, B. East and B. West, with an aggregate population of 44,766. It has iron-foundries, breweries, and distilleries, several flour mills, and other factories. It is connected by railway with Melbourne.

**Ball-cock**, a kind of self-acting stop-cock, opened and shut by means of a hollow sphere or ball of metal attached to the end of a lever connected with the cock. Such cocks are often employed to regulate the supply of water to cisterns. The ball floats on the water in the cistern by its buoyancy, and rises and sinks as the water rises and sinks, shutting off the water in the one case and letting it on in the other.

**Ball-flower,** an architectural ornament resembling a ball placed in a circular flower, the three petals of which form a cup round it; usually inserted in a hollow molding, and generally characteristic of the Decorated Gothic style of the fourteenth century.

Bal'ilol College, Oxford, was founded about 1263 by John Balliol (or Baliol) of Barnard Castle, Durham, and Devorgilla, his wife (parents of John Balliol, king of Scotland). There are a large number of valuable scholarships and exhibitions, including the Snell exhibitions, fourteen in number, held by students from Glasgow University.

**Ballis' tic Pendulum,** an apparatus invented by Robins, toward the close of the eighteenth century, for ascertaining the velocity of military projectiles, and consequently the force of fired gunpowder. A piece of ordnance is fired against bags of sand supported in a strong case or frame suspended so as to swing like a pendulum. The arc through which it vibrates is shown by an index, and the amount of vibration forms a measure of the force or velocity of the ball.

**Balloon**, a gas-tight bag or envelope, generally pear-shaped when inflated with hydrogen-, coal-, or other gas, from which a car or basket is suspended from netting, used for purposes of ascension in free air. The balloon is provided with a suitable valve, operated by a rope which is within reach of the person in the car, by which the gas is permitted to escape when it is desired to descend to the earth. Bags filled with sand are carried in the car, and the *Aeronaut*, or balloonist, empties the sand bag when he desires to rise to a higher altitude. Balloons generally are made of a strong silk. Hot-air balloons use heated air instead of gas for inflation.

Following are some of the principal events in the developments of balloons: 1757, Galien of Avignon wrote on aerostation; 1767, Dr. Black of England ascertained that a light envelope filled with hydrogen gas would as-cend; 1785, hot-air balloon invented by Stephen and Joseph Montgolfler, paper manufactur-ers at Annonay, near Lyons, France. In June of that year, a captive hot-air balloon was made to ascend over 2,000 yds. August 27, a hydrogen balloon made by two brothers by the name of Roberts, under the superintendence of M. Charles, professor of natural philosophy, Paris, was sent up from the Champs de Mars, Paris. This balloon remained in the air three quarters of an hour, fell in a field 15 mi. distant from the place of ascension. Peasants were so terrifled at the appearance of the balloon that they tore it to shreds. September 19, Joseph Montgolfier repeated his former experiment at Versailles. The balloon carried, in a basket suspended from the bag, a sheep, a cock, and duck, the first of living creatures to navigate in the air. October 15, M. Francois Pilatre de Rozier, a young French naturalist, ascended in a captive balloon, the first man to make a balloon ascension. November 21, de Rozier and the Marquis d'Arlandes made the first ascension in a free balloon. The result was successful. This was a fire balloon. December 1, MM. Charles and Robert ascended in Paris, in a balloon inflated with hydrogen gas. Professor Charles invented the balloon valve at the top, and suspended the car from a hoop attached to netting. The first balloon ascension in America was made in Philadel-phia soon after the Montgolfier experiment.


The balloon consisted of 45 small hydrogen balloons, and James Wilcox, a carpenter, made the first ascension.\_ In 1794 balloons were introduced into the French army and used for making observations at the battles of Liege, and Fleurus, and the sieges of Mentz and Ehrenbreitstein. Guy Lussac, a celebrated French chemist, in 1804, reached an altitude of 23,040 ft., and carried up instruments for making scientific observations of the character and properties of the atmosphere at great heights. In 1820 Charles Green, in England, introduced the practise of inflating balloons with illuminating gas. Messrs. Holland, with illuminating gas. Messrs. Holland, Green, and Mason, in 1836, ascended from London in a balloon of 85,000 cu. ft. ca-pacity, and made a voyage of 500 mi. In 1852 Henri Giffard, a young French engineer, built an elongated balloon, filled with coal gas, driven by an aerial screw propeller actuated by a steam engine. September 24, he made an ascension. He was able to make a change in direction in spite of the wind, and this was the first navigable balloon propelled by a motor. Wise, the celebrated American bal-loonist, made an ascension from St. Louis in 1859 and landed in Jefferson co., N. Y., having traveled a distance of 1,150 miles. In 1872 Dupuy de Lome, chief naval constructor of the French government, tested a navigable balloon, in which the propeller was actuated by 14 men in the car. The experiment was fairly successful. The first electrical navigable balloon was built and tested in 1883. Built by Gas-ton Tissandier of France. The apparatus was driven by a Siemens motor weighing 99 pounds, actuated by a primary bichromate of potash battery, weighing 517 pounds, capable of developing 14 horse power for 24 hours. The screw was 9.18 ft. in diameter with two arms. and rotated at 180 revolutions a minute. First ascension made October 8, and the aeronaut succeeded in sailing against the wind and performing several evolutions. The aeronautical establishment of the French war department built an electrical navigable balloon which was the first that ever returned to its moorings after ascending. It was constructed in 1884 under the superintendence and according to the plans of Renard and Krebs, French army officers. The elongated balloon was 165 t. in length and 27<sup>1</sup>/<sub>4</sub> ft. in diameter, and the screw was placed in front. This *air ship*, named *La France*, had a car 105 ft. long. The electric motor was of 9 horse power, and the screw, of two arms, was 27 ft. in diameter. Aug. 9, 1894, a trial was made. The air ship proved perfectly manageable, made a speed of 104 mi. an hour, and was returned to its landing. Other trials proved that the air ship was a navigable balloon. Balloons were used for ob-servation by General McClellan during the Civil War, and he organized a balloon corps. The first woman to make a balloon ascension was Madam Thible, a French woman, who, June 4, 1784, ascended from Lyons in a fireballoon. She is said to be the only woman who ever ascended in a fire balloon. Count Zambeccari was the first balloonist to lose his life.

He made an ascension in a fire-balloon from Bologna, and was compelled to jump from his car because of his balloon catching fire. He was instantly killed. The first parachute descent was made by a dog, which Blanchard, in 1785, carried up with him in a balloon. The dog descended safely. Andre Jaques Garnerin, Oct. 22, 1797, was the first man to safely descend from a balloon in a parachute.

The largest balloon ever made is said to have been the balloon constructed in 1864 by M. Eugene Godard. Its capacity was nearly half a million cubic feet. The air in this fire balloon was heated by an 18-ft. stove, weighing with the chimney, 980 pounds. This fur-nace was fed with straw, and the "car" consisted of a gallery surrounding it. Two ascents of this balloon were made from Cremorne Gardens, on July 20, and July 28, 1864. The "Gáant," Nadar's colossal balloon, contained 215,363 cubic ft. of gas, and raised 35 persons at one time. This balloon was also remarkable as having attached to it a regular two-story house for a car. Its ascent on Sun-day, Oct. 18, 1863, was witnessed by nearly half a million persons. After passing over the eastern part of France, Belgium, and Holland, the "Gaant" suffered a disastrous descent in Hanover on the day after it started on its perilous journey. In 1873 a balloon of 400,000 ft. of cubic capacity was made to enable Mr. Wise to cross the Atlantic, but it unfortu-nately burst. The longest distance traveled in a balloon in the shortest time was 1,150 mi. in 24 hours, by Messrs. Wise and La Mountain, the route taken being from St. Louis, in the direction of New York.

**Balloon-fish**, a curious tropical fish that can inflate itself so as to resemble a ball.

**Bal** lot, voting by, signifies literally voting by means of little balls (called by the French ballottes), usually of different colors, which are put into a box in such a manner as to enable the voter, if he chooses, to conceal for whom or for what he gives his suffrage. The method is adopted by most clubs in the election of their members—a white ball indicating assent, a black ball dissent. Hence, when an applicant is rejected, he is said to be blackballed. The term voting by ballot is also applied in a general way to any method of secret voting, as. for instance, when a person gives his vote by means of a ticket bearing the name of the candidate whom he wishes to support. In this sense vote by ballot is the mode adopted in electing the members of legislative assemblies in most countries, as well as the members of various other bodies. In ancient Greece and Rome the ballot was in common use. In the U.S. the ballot was in use in early colonial times, and was made compulsory in the constitutions of New Jersey, Pennsylvania, and all other states. The Australian ballot system. originated within ten years in the British colonies, has recently been adopted by law in sev-eral of the U.S. By a carefully contrived system of secluding each voter at the polls, and marking and folding the ballots, it claims to

secure greater secrecy and honesty than any other method of voting.

**Ballyme'na**, a town, Ireland, county Antrim, 22 mi. from Belfast, with a considerable trade in linens and linen yarns, the manufacture of which is carried on to a great extent. Pop. 8,655.

**Baim**, a fragrant perennial herb belonging to the order Labiatæ, a native of the south of Europe and Western Asia, and naturalized in a few places in England, has long been cultivated in gardens. The stems and leaves are still occasionally used in medicine as a gentle stimulant and tonic, and were formerly in high repute. The taste is somewhat austere and slightly aromatic. The quantity of essential oil, on which its whole qualities depend, is not more than sufficient to communicate a pleasant flavor to the infusion. A variety of the common catmint, with a smell like that of balm, is often mistaken for it. Moldavian Balm is a native of Eastern Europe, Siberia, etc. Bastard Balm, a native of the south of England and of many parts of Europe, is a very beautiful plant, which when dried has a delightful fragrance, and retains it long.

Baimaceda, JOSE MANUEL (1840-1891), Chilean statesman, early distinguished as a political orator; advocated in Congress separation of church and state; as premier, in 1884, introduced civil marriage; elected president in 1886. A conflict with the Congressional party, provoked by his alleged crueities and official dishonesty, resulted in Balmaceda's exile and suicide.

**Baim of Gilead**, the exudation of a tree, a native of Arabia Felix, and also obtained from another closely allied species. The leaves of the former tree yield when bruised a strong aromatic scent; and the balm of Gilead of the shops, or balsam of Mecca or of Syria, is obuained from it by making an incision in its trunk. It has a yellowish or greenish color, a warm, bitterish, aromatic taste, and an acidulous fragrant smell. It is valued as an odoriferous unguent and cosmetic.

**Baimor al Castle**, the Highland residence of Victoria, Queen of England, beautifully situated on the s. bank of the Dee, in the county of, and 45 mi. w. of Aberdeen. It stands in the midst of fine and varied mountain scenery, is built of granite in the Scottish baronial style, has been recently (1888) enlarged, and has a massive and imposing appearance. The estate, which is the queen's private property, extends to 25,000 acres, mostly deer forest.

**Baisa**, a kind of raft or float used on the coasts and rivers of Peru and other parts of South America for fishing, for landing goods and passengers through a heavy surf, and for other purposes where buoyancy is chiefly wanted. It is formed generally of two inflated seal skins, connected by a sort of platform on which the fisherman, passengers, or goods are placed.

**Baisam**, an aromatic, resinous substance, flowing spontaneously or by incision from certain plants. A great variety of substances pass under this name. But in chemistry the term is confined to such vegetable juices as consist of resins mixed with volatile oils, and yield the volatile oil on distillation. The resins are produced from the oils by oxidation. A balsam is thus intermediate between a volatile oil and a resin. It is soluble in alcohol and ether, and capable of yielding benzoic acid. The balsams are either liquid or more or less solid; as, for example, the balm of Gilead, and the balsams of Copiapo, Peru, and Tolu. Benzoin, dragon's-blood, and storax are not true balsams, though sometimes called so. The balsams are used in perfumery, medicine, and the arts.

Balsam Fir, the balm of Gilead fir.

**Balta**, a Russian town, government of Podolia. 115 mi. n.n.w. of Odessa. Pop. 32,558.

**Baltic,** Battle of the, the defeat of the Danish fleet at Copenhagen by Sir Hyde Parker and Nelson in 1801.

**Baltic Provinces,** a term commonly given to the Russian governments of Courland, Livonia, and Esthonia. Area 201,526 sq. mi.; pop. 6, 450.835.

Baltic Sea, an inland sea or large gulf connected with the North Sea, washing the coasts of Denmark, Germany, Russia, and Sweden. Area 171,743 sq. mi. A chain of islands separates the southern part from the northern, or Gulf of Bothnia. In the northeast the Gulf of Finland stretches far into Russia, and separates Finland from Esthonia; the Gulf of Riga washes the shores of the three Russian governments of Courland, Livonia, and Esthonia; while the Gulf of Danzig is an inlet on the Prussian coast. The water of the Baltic is colder and clearer than that of the ocean; it contains a smaller proportion of salt, and the ice obstructs the navigation three or four months in the year. More than 250 rivers run into the Baltic, which has a large trade, and numbers among its more important harbors the cities of Copenhagen, Viel, Danzig, Memel, Riga, Cronstadt, and Stockholm. The Sleswig-Holstein Canal, near Kiel, forms a method of access to the North Sea. The Sound, the Great and the Little Belt, lead from the Kattegat into the Baltic.

**Bal'timore,** Baltimore co., Md. on the n. side of the Patapsco, 14 mi. above Chesapeake Bay. Baltimore takes its name from Lord Baltimore, the founder of Maryland; it was first laid out as a town in 1729, and was erected into a city in 1797. It is well built, chiefly of brick, and is known as the "monumental city," from the public monuments which adorn it, the principal being the Washington Monument. Among its buildings are the city hall, built in Renaissance style, of white marble with a tower and dome rising 240 feet; the Peabody Institute, containing a library, art gallery, etc.; the Maryland Institute; the custom-house: the post-office: the U. S. court-house and jail, the Johns Hopkins Hospital, the Roman Catholic cathedral, etc. The chief educational institution, now one of the most important in the States, is the Johns

### Baltimore

by its founder (whose name it bears). The University of Maryland is one of the oldest medical schools in the U. S., established in 1812. Industries: ship-building; manufactures of iron, wool, cotton, pottery, etc.: sugarrefining, distilling, tanning, the making of agricultural implements, canning oysters, and fruits, etc. As a flour market Baltimore is an important center; and it does an immense trade in exporting tobacco and other products. The harbor is very extensive, and has been much improved. Pop. 434,439.

much improved. Pop. 434,439. **Baltimore**, GEORGE CALVERT, LORD (1580-1632), b. in Yorkshire. He was for some time secretary of state to James I, but this post he resigned in 1624 in consequence of having become a Roman Catholic. Notwithstanding this he retained the confidence of the king, who in 1625 raised him to the Irish peerage, his title being from Baltimore, a fishing village of Cork. He had previously obtained a grant of land in Newfoundland, but as this colony was much exposed to the attacks of the French he left it, and obtained another patent for Maryland. He died before the charter was completed, and it was granted to his son Cecil, who deputed the governorship to his brother Leonard (1606-47).

**Baltimore Bird** (or oriole), an American bird, nearly allied to the starlings. It is a mi-



### Baltimore Orlole.

gratory bird, and is known also by the names of "golden robin," "hang-bird," and "firebird." It is about 7 inches long; the head and upper parts are black; the under parts of a brilliant orange hue. It builds a pouch-like nest, very skillfully constructed of threads deftly interwoven, suspended from a forked branch and shaded by overhanging leaves. It feeds on insects, caterpillars, beetles, etc. Its song is a clear, mellow whistle.

**Baluchistan** (ba-lö'chi-stän), a country in Asia, consists of the districts of Quetta and Bolan. Area 160,000 sq. mi.; pop. est. at 400,-000. The general surface of the country is rugged and mountainous, with some extensive intervals of barren, sandy deserts, and there is a general deficiency of water. The country is almost entirely occupied by pastoral tribes under semi-independent sirdars or chiefs. The Khan of Khelat is nominal ruler of the whole land, and in 1877 concluded a treaty with Britain, in virtue of which he has become a feudatory of the Empress of India. The right had already been secured of occupying at pleasure the mountain passes between Khelat and Afghanistan; but the new treaty places the whole country at the disposal of the British government for all military and strategical purposes. Khelat is the capital, and Quetta, a town in the northeast, is the principal city.

Balzac (bal-zak), HONOREDE (1799-1850), a celebrated French novelist, b. at Tours. Before completing his twenty-fourth year he had published a number of novels under various noms de plume, but the success attending all was very indifferent; and it was not till 1829, by the publication of Le Dernier Chouan, a tale of La Vendée, and the first novel to which Balzac appended his name, that the attention of the public was drawn to the extraordinary genius of the author. A still greater popularity at-tended his *Physiologie de Mariage*, a work full of piquant and caustic observations on human nature. He wrote a large number of novels, all marked by a singular knowledge of human nature and distinct delineation of character. but apt to be marred by exaggeration. A collected edition of his works under the title In Comédie Humaine was published in 45 volumes.

**Bamba**, a district of the Congo, w. coast of Africa, lying to the south of the river Ambriz. It is thickly populated, and is rich in gold, silver, copper, salt, etc.

**Bambar' ra**, a negro kingdom of Central Africa. on the Joliba (or Upper Niger), first visited by Mungo Park. The country is generally very fertile, producing wheat, rice, maize, yams, etc. The inhabitants belong to the Mandingo race, and are partly Mohammedans. Excellent cotton cloth is made. The capital is Sego. Pop. est. at 2.000,000.

**Bam'berg**, a town of Germany, Bavaria. It is the seat of a Catholic archbishop: the cathedral, founded in 1004, is one of the finest churches in Germany. The royal library contains 100,000 volumes and valuable MSS. Bamberg carries on a large trade; its industries are cotton spinning, tobacco manufacture, brewing, etc. Pop. 38,815.

**Bambino** (bam-bē'no) (Ital., an infant), the figure of our Saviour represented as an infant in swaddling clothes. The Santissimo Bambino in the church of Ara Ceeli at Rome, a richly decorated figure carved in wood, is believed to have a miraculous virtue in curing diseases. Bambinoes are set up for the adoration of the faithful in many places in Catholic countries.

**Bambocciades** (bam-boch-ādz') pictures, generally grotesque. of common, rustic, or low life. such as those of Peter Van Laar, a Dutch painter of the seventeenth century, who on account of his deformity was called *Bamboccio* (cripple). Teniers is the great master of this style.

**Bamboo'**, the common name of the arborescent grasses belonging to the genus Bambusa.

### Bambook

There are many species, belonging to the warmer parts of Asia, Africa, and America, and growing from a few feet to as much as 100 ft., requiring much moisture to thrive properly. The best-known species is common in tropical and sub-tropical regions. From the creeping underground rhizome, which is long, thick, and jointed, spring several round jointed stalks, which send out from their joints several shoots, the stalks also being armed at their joints with one or two sharp, rigid spines, The oval leaves, 8 or 9



Bamboo. a.-upper portion of the stem with foliage. b.-root stem. c.-section of stem.

inches long, are placed on short footstalks. The flowers grow in large panicles from the joints of the stalk. Some stems grow to 8 or 10 inches in diameter, and are so hard and durable as to be used for building purposes. The smaller stalks are used for walking sticks, flutes, etc.; and indeed the plant is used for innumerable purposes in the East Indies, China, and other Eastern countries. Cottages are almost wholly made of it; also, bridges, boxes, water pipes, ladders, fences, bows and arrows, spears, baskets, mats, paper, masts for boats, etc. The young shoots are pickled and eaten, or otherwise used as food. The seeds of some species are also eaten. The bamboo is imported into Europe and America as a paper material as well as for other purposes. Bambook', a country in Western Africa.

**Bambook'**, a country in Western Africa. The natives are Mandingoes, mostly professed Mohammedans ruled by independent chieftains, most of whom acknowledge the supremacy of France. Gold and ivory are exchanged for European goods.

# Banana

**Bam' ian**, a valley and pass of Afghanistan, the latter at an elevation of 8,496 feet, the only known pass over the Hindu Kush for artillery



The Largest of the Figures at Bamian.

and heavy transport. The valley is one of the chief centers of Buddhist worship, and contains five remarkable colossal statues from two to three hundred feet high, carved in the rocks, and other ancient monuments.

**Ban**, anciently, a title given to the military chiefs who guarded the eastern marches of Hungary, now the title of the governor of Croatia and Slavonia, a division of the kingdom of Hungary. A province over which a ban is placed is called *banat*.

**Bana**<sup>i</sup> na, a plant of the genus *Musa*. It is originally indigenous to the East Indies, and



an herbaceous plant with an underground stem. The apparent stem, which is some-



### Banana

times as high as 30 feet, is formed of the closely compacted sheaths of the leaves. The leaves are 6 to 10 feet long and 1 or more broad, with a strong midrib, from which the veins are given off at right angles; they are used for thatch, basket-making, etc., besides yielding a useful fiber. The spikes of the flowers grow nearly 4 feet long, in bunches, covered with purple-colored bracts. The fruit is 4 to 10 or 12 inches long, and 1 inch or more in diameter; it grows in large bunches, weighing often from 40 to 80 pounds. The pulp is soft and of a luscious taste; when ripe it is eaten raw or fried in slices. The banana is cultivated in tropical and sub-tropical countries, and is an important article of food. Manilla hemp is the product of a species of banana.

**Bana'na**, an African port, belonging to the Congo Free State, situated at the mouth of the river Congo.

**Banana-bird**, a pretty bird, a native of the West Indies and the warmer parts of America. It is a lively bird, easily domesticated, tawny and black in color, with white bars upon the wings.

**Banbury** (ban'be-ri), a town of England, in Oxford, long celebrated for its cheese, its cakes, and its ale. Pop. 12,768.

**Banca**, an island belonging to the Dutch East Indies, between Sumatra and Borneo, pop. 62,000, of which a considerable proportion are Chinese. It is celebrated for its excellent tin, of which the annual yield is above 4,000 tons; but it produces nothing else of any importance.

Bancroft, GEORGE (1800–1891), American istorian, b. at Worcester, Mass. He entered historian, b. at Worcester, Mass. He entered Harvard 1813 and graduated 1817. Studied history and philology at Göttengen 1818. Re-ceived degree Ph. D. 1820. He attended the lectures of Hegel at Berlin, and while traveling on the continent formed the acquaintance of eminent scholars, among them Savigny, Schlosser, and Goethe. After returning to America he taught for a time, then entered politics, and was made collector of customs at Boston. While lecturing on German litera-ture he continued his literary labors and published (1834-41) The History of the Colonization of the United States. Later this work was embodied in his larger history of *The United* States of North America. He was secretary of the navy under Polk (1845), and established the naval school at Annapolis. He was ambassador to England (1846). He published (1852), History of the Revolution in North America, from material collected while in England. His oration in honor of Abraham Lincoln, delivered 1866, is of historic value. He was minister to Russia (1867), and to the North German Confederation (1868). In 1871 he was accredited to the German empire. For many years he was an eminent contributor to *The North American Review.* While secretary of the navy he gave the order to take possession of California in case of war with Mexico. He was secretary of war one month, and gave the order to march

into Texas. His last public address was given at Washington, D. C., April 27, 1886. Bancroft, HUBERT HOWE (1832 -----), Amer-

**Bancroft**, HUBERT HOWE (1832 — ), American historian, b. in Ohio, went to California in 1852, and engaged in the publishing business. He acquired a magnificent library of books relating to the history of the Pacific Coast, and in 1875 published in five volumes his work on *The Native Races of the Pacific States*. In 1882 he published the first volume of his *History of the Pacific States*. He has written on the Spanish missions of California and the vigilance committees.

**Ban'croft**, RICHARD (1544-1610), an English prelate, entered the church, and rose rapidly during the reign of Elizabeth till he obtained the see of London in 1597. James I made him Archbishop of Canterbury on the death of Whitgift.

**Bandage**, a surgical wrapper of some kind applied to a limb or other portion of the body

to keep parts in position, exert a pressure, or for other purpose. To be able, to apply a bandage suitably in the case of an accident is a highly useful acc om pl is hm en t, which through the teaching of ambulance surgery now so common, may be easily acquired. See Surgery.

Boller Bandage.

**Banda Islands**, a group belonging to

Holland, Indian Archipelago. They are beautiful islands, of volcanic origin, yielding quantities of nutmeg. Goenong Api, or Fire Mountain, is a cone-shaped volcano which rises 2,320 feet above the sca. Pop. 6,700.

**Bandan'na,** a variety of silk handkerchief having a uniformly dyed ground, usually of bright red or blue, ornamented with white or yellow circular, lozenge-shaped, or other simple figures produced by discharging the ground color.

**Ban' dicoot**, the largest known species of rat, attaining the weight of 2 or 3 lbs..and the length, including the tail, of 24 to 30 in. It is anative of India, and is very abundant in Ceylon. Its flesh is said to be delicate and to resemble young pork, and is a favorite article of diet with the coolies. It is destructive to rice fields and gardens. The name is also given to a family of Australian marsupials. The most common species, the long-nosed bandicoot, measures about 14 ft. from the tip of the snout to the origin of the tail, and in general appearance bears a considerable resemblance to a large, overgrown rat.

**Baneberry**, a European plant, local in England, with a spike of white flowers and black, poisonous berries. Two American species are considered remedies for rattlesnake bite.

considered remedies for rattlesnake bite. Banff (bamf), county town of Banffshire, Scotland, a seaport on the Moray Firth at the

# Bangalore

mouth of the Deveron. It is well built, carries on some ship-building, and has a rope and sail work, a brewery, etc., with a fishing and shipping trade. Pop. 7,598. The county has an area of 686 sq. mi. Little wheat is raised, the principal crops being barley, oats, turnips, and potatoes. Fishing is an important industry; as is also the distilling of whisky. Pop. 64,107.

**Bangalore'**, a town of Hindustan, capital of Mysore, and giving its name to a considerable district in the east of Mysore state. The town stands on a healthy plateau 3,000 ft. above sea-level, has a total area of nearly 14 sq. mi., and is one of the pleasantest British stations in India. In the old town stands the fort, reconstructed by Hyder Ali in 1761, and taken by Lord Cornwallis in 1791. There are manufactures of silks, cotton cloth, carpets, gold and silver lace, etc. Pop. 180,366. The Bangalore district has an area of nearly 3,000 sq. mi., of which more than half represents cultivable land. Pop. 802,904.

Bangkok' (or Bankok), the capital of the kingdom of Siam. The inner city occupies an island surrounded with walls and bastions, and contains the palace of the king and other important buildings. A large portion of the population dwell in boats or wooden houses erected on bamboo rafts moored in the river, and forming a floating town. Houses in the European style are beginning to be erected, and among other advances recently made are the introduction of the telegraph and telephone, gas, fire-engines, and omnibuses. The exports consist chiefly of rice, sugar, silk, cotton, tobacco, pepper, sesame, ivory, aromatic wood, cabinet woods, tin, hides, etc.; and the imports consist chiefly of British cotton, woolen, and other goods. Pop. 350,000.

**Ban gor**, a city of North Wales, in Caernarvonshire. Since the construction of the Menai Bridge, Bangor has risen into some importance as a popular resort; its principal trade is in the export of slates from the neighboring quarries. Pop. 12,261.

**Ban** gor, a port of Penobscot co., Maine, on the w. side of Penobscot River, a flourishing and pleasantly situated town, and one of the largest lumber depots in the world. The river is navigable to the town for vessels of the largest size. Pop. 19, 103.

**Bangweo'lo**, lake in South Africa, the southernmost of the great lake reservoirs of the Congo, discovered by Livingstone in 1868, an oval-shaped shallow sheet of water, said to be 150 mi. in length along its greater axis from e. to w., and about 75 mi. in width, but its exact limits are uncertain.

**Ban'ian** (or Ban'yan), Indian trader or merchant, one engaged in commerce generally, but more particularly one of the great traders of Western India, as in the seaports of Bombay, Kurrachee, etc., who carry on a large trade by means of caravans with the interior of Asia, and with Africa by vessels. They form a class of the Vaisya caste, wear'a peculiar dress, and are strict in the observance of fasts and in abstaining from the use of flesh. Hence --Banian days, days in which sailors in the navy had no flesh meat served out to them. Banian days are now abolished, but the term is still applied to days of poor fare.

**Ban' jarmassin**, a district and town in the s.e. of Borneo, under the government of the Dutch. Exports: pepper, benzoin, bezoar, rattans, dragon's-blood, birds'-nests, etc.; im ports: rice, salt, sugar, opium, etc. Pop. of the district, 864,360.

**Ban** jo, a stringed instrument, the favorite musical instrument of the negroes of the Southern states. It is six stringed, has a body like a tambourine and neck like a guitar, and is played by stopping the strings with the fingers of the left hand and twitching or striking them with the fingers of the right. The upper or octave string, however, is never stopped.

stopped. Banks and Banking.— The definition of the word bank, etymologically considered, is a bench—its derivation is the Italian word banco —a bench upon which the Italian money dealers keep their money piled. This, at least, is the general acceptation of the term. Other authorities, and not without a show of reason, claim that the word is derived from the old German banck, which, however, has two meanings; one a pile and the other a bench. That the meaning of the word as applied to a heap or pile, is the origin of our modern term bank, is to a certain extent substantiated by the fact that among the early Italian bankers any aggregation of capital was termed a Monte. Thus to quote the words of Mr. Macleod:—

"At this time the Germans were masters of "At this time the Germans were masters of a great part of Italy, and the German word banck, meaning a heap, came to be used as synonymous with Monte, and was Italianized into Banco, and the public loans were called indifferently Monti or Banchi." The public pawn banks in France and Italy are still called Monte. This was also the interpretation given to the word during the colonial days of this country.

Professor Summer says in his History of Banking in the United States: "The sense of bank would be best expressed by batch, because it was applied to the mass of bills provided for and loaned out at one time, under one act of legislation." And again, "The first bank in that Colony (Rhode Island) was for £30,000 issued in 1715 for ten years."

Banking, in its modern sense, was not unknown to the earlier civilizations. Excavations at Babylon have revealed tablets showing the records of a bank account as early as 600 B.C. Rome, however, can be called the birthplace of banking. Cicero in his letters speaks of bills of exchange, and a number of banking terms then in vogue are used in the same sense at the present day. The principles underlying our present system have come down to us from the days of imperial Rome without change or The Crusades of the Middle modification. Ages were mainly instrumental in the development of banking in the earlier Italian Republics, and the demands of the times gave birth to the banking firms of the Medici and the

Pitti; the princely houses which at the same time presided over the destinies of state and controlled the marts of trade. The Bank of Venice, the Bank of St. George at Genoa, and the Bank of Amsterdam are the oldest banks in history, and while not strictly banks in the modern acceptation of the term, they were the forerunners of the magnificent institutions which now control the destinies of commerce. The Bank of England owes its origin to the exigencies of the time when it was founded, and its present strength and powers of usefulness are the results of a development toward which all classes, from the philosopher to the mechanic, have contributed a share.

The modern understanding of the functions of a bank is that it is an institution used for the purpose of distributing capital where it can be made productive. Its sole purpose is supposed to be that of facilitating commerce between individuals, communities, and nations. The following description of the workings of the Bank of England, and the joint stock banks of London, may be aptly taken as an illustration: "Money is collected in the country districts by local banks, such of it as can be used is loaned at home, while the balanceand this comprises generally the larger portion of such funds-is remitted to London to be held there as a reserve. Money is remitted by foreign countries for the purchase of commodities which have no other mart, or is attracted by a higher rate of interest. Thus a steady stream pours in from all parts and accumulates in the one center until active employment for it is found; and thus has London developed into the money market, not only of England, but of the world. The money from agricultural districts is loaned in the indus-The money from France is trial regions. loaned in South America, but London acts as the broker."

A similar process is at work in every large city where commercial relations are established. The wants of the individual, the business man, the corporation, the municipality, are all supplied by the local banking institutions collecting the money from many sources, primarily for the purposes of safe-keeping, and then as remuneration for its services, exacting a charge from borrowers commensurate with the value of the money and the extent of the risk incurred in loaning it.

Each country has a different system of banking. In the continental countries of Europe the center institution is generally a state bank with the privilege of issuing notes, and is surrounded by minor institutions which follow out distinct lines of business. In England we find the Bank of England and that wonderful group of joint stock banks showing deposits for an aggregate sum of \$2,800,000,000, while in the U.S. the national banking system, and the so-called state banks-i. e., banks deriving their charter from the respective states in which they are located-hold their sway.

Banks in the U.S.-The first U.S. Bank was chartered in 1791. Previous to this time

there were three banks in the U.S. with an aggregate capital of \$2,000,000; the Bank of North America, chartered by Congress in 1780, and by Pennsylvania in the following year, with a capital of \$400.000; the Bank of Massachusetts in 1784; the Bank of New York in the same year. The U. S. Bank charter was limited to 1811, or twenty years from date of issue. Its capital was \$10,000,000, and the government retained the right to subscribe one fifth; \$5,700,000 to be held in Philadelphia and the remainder to be distributed among the branches. Headquarters were to be at Philadelphia, and the bank had twenty directors. All the stock was sold in 1802 at a premium. The bank was not rechartered; it was opposed as unconstitutional, as in the hands of foreigners, and injurious to local banks. Owing largely to this failure to re-charter, specie payments were suspended in 1814. In 1816 President Madison approved the bill chartering a U.S. Bank with a capital of \$35,000,000, of which the government subscribed \$7,000,000, and citizens the rest. This charter was limited to twenty years. The government funds were kept on vears. deposit at this bank. President Jackson opposed the bank, and when the bank asked for a renewal of its charter in 1831, the act was passed by Congress, but was vetoed by the president. Pennsylvania rechartered the bank thirteen days before the original charter expired. It was known as the U.S. Bank of Pennsylvania. It suspended specie payment in 1837 and again in 1839, and a final suspension was made in 1840-41. It proved a total loss to the shareholders. New York adopted a banking system in 1838, and Ohio adopted the safety fund system. The first clearing house in America was established in 1853 in New York. At the beginning of the Civil War in 1861, there were 1,600 state banks having a gross aggregate capital of \$429,000,000, with 10,000 different kinds of notes in circulation. A national bank system was devised by Secretary Chase, and in 1863 Congress made paper currency and the banking laws of the country uniform. State banks were forced to surrender their charters and become national banks. In 1870 the circulation of the national banks was limited to \$354,000,000, secured by deposit of government bonds with the treasurer. This limitation has since been repealed: 2,572 of the state banks still exist having a total capital of \$208,564,841. Following is the number of national banks in the twenty principal cities of the Union: New York, 47; Chicago, 19; St. Louis, 8: Boston, 56; Albany, 6; Brooklyn, 5; Philadelphia, 45; Pittsburg, 26: Baltimore, 19; Washington, 11; New Orleans, 10; Louisville, 10; Cincinnati, 13; Cleveland, 10: Detroit, 8; St. Paul, 6; Minneapolis, 6; Kansas City, 10; Omaha, 9: and San Francisco, 2. These banks are obliged to keep a reserve of 25 per cent. of deposits. The total amount of resources of all the national banks in operation in 1885 was \$2,-432,900,000; in 1896 \$3,263,700,000; total specie, coin and coin certificates held by national banks in October, 1896, was \$200,808,632.47. Banks, Savings, See Savings Banks.

JOHN E. GARDIN.

Banki'va Fowl, a fowl living wild in Northern India, Java, Sumatra, etc., believed to be the original of our common domestic fowls.

**Bankrupt**, a person whom the law does or may take cognizance of as unable to pay his debts. Properly it is of narrower signification than insolvent, an insolvent person simply being unable to pay all his debts. In England up till 1861 the term bankrupt was limited to an insolvent trader, and such traders were on a different footing from other insolvent persons, the latter not getting the same legal relief from their debts. In all civilized communities laws have been passed regarding bankruptcy. At present bankruptcy in Eng-land is regulated by the Bankruptcy Act of 1883, which has as its essential feature the intervention of the Board of Trade at all stages of the bankruptcy, with the object of obtaining full official supervision and control. In America Congress has the power of legislating upon bankruptcy and upon two occasions has done so. A federal statute in force suspends all state laws on bankruptcy. There is now no federal statute in operation, but the Torrey bankruptcy bill is before Congress. Several of the states have bankruptcy laws in operation, the northern or commercial states favoring such enactments and the southern objecting to this kind of legislation.

Banks, JOSEPH (1743-1820), a noted British naturalist. He was chosen a member of the Royal Society in 1766, and soon after went to Newfoundland and Hudson's Bay to collect plants. In 1768, with Dr. Solander, a Swedish gentleman, pupil of Linnæus, and then assistant librarian at the British Museum, he accompanied Cook's expedition as naturalist. In 1772 he visited Iceland along with Dr. Sol-ander, and during this voyage the Hebrides were examined, and the columnar formation of the rocks of Staffa first made known to naturalists. In 1777 Banks was chosen president of the Royal Society, in 1781 was made a baronet, and in 1795 received the order of the He wrote only essays, papers for Bath. learned societies, and short treatises. He bequeathed his collections to the British Museum.

Banks, THOMAS (1735-1805), an English sculptor. He studied sculpture in the Royal Academy and in Italy. On leaving Italy he spent two unsatisfactory years in Russia, and then returned to England, where he was soon after made an academician. Among his works was a colossal statue of Achilles Mourning the Loss of Briseis in the hall of the British Institution, and the monument of Sir Eyre Coote in Westminster Abbey.

Banks, NATHANIEL PRENTISS (1816- ), an American soldier, b. at Waltham, Mass. Learned the trade of a machinist, and became first a lecturer, then a local newspaper editor, studied law, then representative in the legislature, governor of Massachusetts, speaker in U. S. Congress 1856-57, and general of volunteers in 1862. His first military effort was made at the battle of Winchester, where he was attacked by the forces of "Stonewall" Jackson. Later General Banks was placed in command of the defenses of Washington, while preparations were being secretly made to send a strong expedition by sea to New Orleans. He was assigned to command this expedition, which sailed from New York in November and December. On reaching New Orleans he succeeded Gen. B. F. Butler in command. In July the news of the surrender of Vicksburg was received, and on the ninth of that month the garrison of Port Hudson, 6,000 in number, capitulated to the investing forces of General Banks. In the early part of the following year the army of General Banks was joined by 10,000 men, under Gen. A. J. Smith. The united forces advanced as far as Sabine Cross Roads. Here the Federals were met by the Confederate forces under Gen. Richard Taylor, and driven back to Pleasant Hill; but on the following day, when the Confederates saw fit to renew the attack, they were repelled. The Federal army then retired to the Mississippi River. In May, 1864, General Banks was relieved of his command, resigned his commission, and returned to his native state, where he was biennially elected to Congress by his former constituents until 1877, failing only in 1872. For a long time General Banks was chairman of the committee on foreign relations. He afterward served as U. S. marshal for Massachusetts, and was again elected to Congress in 1888 from the fifth Massachusetts district as a Republican.

Banksia, a North American species of pine



Banksia.

A.-shoot; B.-single flower enlarged; C.-in section.

tree growing around Hudson's Bay, about 25 ft. high.

Bann, Upper and Lower, two rivers in the n. of Ireland, the former rising in the mountains of Mourne, county Down, and after flowing 38 mi. in a n. direction, falling into Lough Neagh, the latter being the outlet of Lough Neagh, and falling into the Atlantic Ocean 4 mi. below Coleraine, after a course of nearly 40 mi.

Ban'natyne Club, a literary society instituted in Edinburgh (1823) by Sir Walter Scott 7.

(its first president). David Laing (secretary till its dissolution in 1805), Archibald Constable, and Thomas Thomson. It started with thirtyone members, subsequently extended to 100, having as its object the printing of rare works on Scotch history, literature, geography, etc. It derived its name from George Bannatyne (1545-1609), the collector of the famous MSS of early Scottish poetry.

**Bannockburn**, a village of Scotland, in Stirlingshire, 2 mi. s.e. Stirling, famous for the decisive battle in which King Robert Bruce of Scotland defeated Edward II of England, on June 24, 1314. It has manufactures of woolens, such as tartans, carpets, etc. Pop. 3,374.

**Bannu**, a district in the Punjab, Hindustan, on the nortwestern frontier. Area 3,868 sq. mi.; pop. 332,577, of whom nearly half are Afghans.

**Banquette** (bang-ket'), in fortification, the elevation of earth behind a parapet, on which the garrison or defenders may stand. The height of the parapet above the banquette is usually about 4 feet 6 inches; the breadth of the banquette from 2½ or 3 feet to 4 or 6 feet according to the number of ranks to occupy it. It is frequently made double; that is, a second is made still lower.

**Banshee'** (Benshi'), a weird hag, believed in Ireland and some parts of Scotland to attach herself to a particular house, and to appear or make her presence known by wailing before the death of one of the family.

**Ban'tam**, a residency occupying the whole of the w. end of the island of Java. It formed an independent kingdom, governed by its own sultan, till 1683, and the Dutch exercised suzerainty with brief intermission until its formal incorporation by them at the beginning of the present century. It produces rice, coffee, sugar, cinnamon, etc. Serang is its capital. The town Bantam was the first Dutch settlement in Java (1505), and for some time their principal mart, though now greatly decayed.

**Ban'tam Fowl**, a small but spirited breed of domestic fowl, first brought from the East Indies, supposed to derive its name from Bantam in Java. Most of the sub-varieties have feathered legs; but these are not to be preferred. In point of color the black and nankeen varieties take the palm. A well-bred bantam does not weigh more than a pound.

**Ban'try, a** small seaport town near the head of Bantry Bay, county Cork, Ireland. The bay, one of three large inlets at the s. w. extremity of Ireland, affords an unsurpassed anchorage.

**Bantu** (bān-tö'), the ethnological name of a group of African races, including the Kaffirs, Zulus, Bechuanas, the tribes of the Loango, Congo, etc., but not the Hottentots.

**Banx'ring**, a quadruped belonging to the Insectivora, or insect-eaters, inhabiting the Indian Archipelago, bearing some resemblance externally to a squirrel, but having a long, pointed snout. They live among trees, which they ascend with great agility.

Ban'yan (or Ban'ian), a tree of India, of

### Baobab

the fig genus. The most peculiar feature of this tree is its method of throwing out from the horizontal branches, supports which take root as soon as they reach the ground, enlarge into trunks, and extending branches in their turn, soon cover a prodigious extent of ground. A celebrated banyan-tree has been known to shelter 7,000 men beneath its shade. The wood is soft and porous, and from its white, glutinous juice bird-lime is sometimes prepared. Both juice and bark are regarded by the Hindus as valuable medicines. One of the largest banyan trees known to exist has been discovered on one of the Howe Islands, 300 miles from Port Macquarie, in Australia.



Banyan Tree.

and the space it covers is nearly seven acres. Five acres is the area covered by a banyantree growing on the banks of the river Narbudda, in the Province of Guzerat, India. It is distinguished by the name of Cubbeer Burr, which was given it in honor of a famous saint. High floods have at various times swept away parts of this extraordinary tree, but what remains is nearly 2,000 ft. in circumference, measured round the principal stems; the overhanging branches not yet struck down cover a much larger space. The large trunks of this tree amount to 350, and the smaller ones exceed 3,000, every one of which is constantly sending forth branches and hanging roots to form other trunks. It is said that 7,000 persons find ample room to repose under its shade.

**Ba'obab** (or Monkey-bread Tree), a tree, the only known species of its genus, which was named after the naturalist Adanson. It is one of the largest of trees, its trunk sometimes attaining a diameter of 30 feet; and as the profusion of leaves and drooping boughs sometimes almost hides the stem, the whole forms a hemispherical mass of verdure 140 to 150 feet in diameter and 60 to 70 feet high. It is a native of Western Africa, and is found also in Abyssinia; it is cultivated in many of the warmer parts of the world. The roots are of extraordinary length, a tree 77 feet in girth having a tap-root 110 feet in length. The leaves are deep green, divided into five une-

# Baptism

qual parts lanceolate in shape, and radiating from a common center. The flowers resemble the white poppy, having snowy petals and violet-colored stamens: and the fruit, which is large and of an oblong shape, is said to taste like gingerbread, with a pleasant acid flavor. The wood is pale-colored, light, and soft. The tree is liable to be attacked by a fungus which, vegetating in the woody part. renders it soft and pithlike. By the negroes of the



Baobab Tree.

West Coast these trunks are hollowed into chambers, and dead bodies are suspended in them. There they become perfectly dry and well preserved, without further preparation or embalming. The pulverized leaves constitute *kalo*, which the natives mix with their daily food to diminish excessive perspiration, and which is even used by Europeans in fevers and diarrheas. The expressed juice of the fruit is used as a cooling drink in putrid fevers, and also as a seasoning for various foods.

Baptism, a rite which is generally thought to have been usual with the Jews even before Christ, being administered to proselytes. From this baptism, however, that of St. John the Baptist differed, because he baptized Jews also as a symbol of the necessity of perfect purification from sin. Christ himself never baptized, but directed his disciples to administer this rite to converts (Matt. 28: 19); and baptism, therefore, became a religious ceremony among Christians, taking rank as a sacrament with all sects which acknowledge sacraments. In the primitive church the person to be baptized was dipped in a river or in a vessel, with the words which Christ had ordered, generally adopting a new name to further express the change. Sprinkling, or, as it was termed, *clinic* baptism, was used only in the case of the sick who could not leave their beds. The Greek church and Eastern schismatics retained the custom of immer-

# Barbara

sion; but the Western church adopted or allowed the mode of baptism by pouring or sprinkling, since continued by most Protestants. This practise can be traced back certainly to the third century, before which its existence is disputed. Since the Reformation there have been various Protestant sects called Baptists, holding that baptism should be administered only by immersion, and to those who can make a personal profession of faith.

**Bap' tists**, a Protestant sect, distinguished by their opinions respecting the mode and subjects of baptism. With regard to the mode, they maintain the necessity of immersion.

**Barabin'zians**, a rude, uncultivated tribe of Tatars, subsisting chiefly on the produce of their herds and on fish supplied by the lakes of the Baraba steppe.

**Baraguey-d'hilliers** (bå-rå-gå-dël-yå), Louis (1764-1812), a distinguished French general under the first Empire. He joined the army of Italy, and took Bergamo and Venice, of which he became governor. He took part in the expedition to Egypt, served in the campaigns in Germany and Spain, and commanded a division of the great army in the Russian campaign of 1812. Napoleon ordered him to return to France as under arrest, but, overcome with grief and fatigue, he died at Berlin on the way. His son Achille (1795-1878), was a distinguished soldier in the Crimean and Austrian wars.

**Barb**, a horse of the Barbary breed, introduced by the Moors into Spain, and of great speed, endurance, and docility.

Barba' does (or Barbados), the most eastern of the West Indies Islands, first mentioned in 1518, and occupied by the British in 1625. Area 166 sq. mi.; capital, Bridgetown; pop. 20,996. The island is more densely peopled than almost any spot in the world, the popula-tion being 182,306. The climate is very hot, though moderated by the constant tradewinds; and the island is subject to dreadful hurricanes. The black low-land soil gives great returns of sugar in favorable seasons. The chief exports, besides sugar, are molasses and rum; imports: rice, salt meat, corn, butter, flour, etc. Barbadoes has a considerable transit trade, being in some measure the central mart for all the Windward Islands. It is the headquarters of the British forces in the West Indies. There is a railway across the The island, also tramways, telephones, etc. island forms a distinct government under a governor, an executive and a legislative council, and a house of assembly.

**Barbadoes Cherry**, the pleasant, tart, fieshy fruit of a West Indian tree 15 ft. high.

**Barbadoes Gooseberry**, the fruit of a West Indian species of cactus.

**Bar' bara**, St., according to the legend belonged to Nicomedia, in Asia Minor, and was beheaded by her father for having turned Christian, he being immediately thereafter struck dead by lightning. She is invoked in storms, and is considered the patron saint of artillerists.



### Barbarian

**Barbarian**, a name given by the Greeks and afterward by the Romans to every one who spoke an unintelligible language; and hence coming to connote the idea of *rude*, *illiterate*, *uncivilized*. This word, therefore, did not always convey the idea of something odious or savage; thus Plautus calls Nævius a barbarous poet, because he had not written in Greek; and Cicero terms illiterate persons without taste "barbarians."

**Barbarossa**, a surname given to Frederick I, of Germany.

**Barbarossa** ("red-beard"), the name of two famous Turkish corsairs of the sixteenth century, who ravaged the shores of the Mediterranean, and established themselves in Algiers. The elder of the brothers, Aruch (or Horuk), was killed in 1518; the younger and more notorious, Hayyraddin, who captured Tunis, died in 1546.

Bar'bary, a general name for the most northerly portion of Africa, comprising Morocco, Fez, Algeria, Tunis, and Tripoli (includ-ing Barca and Fezzan). The principal races are: the Berbers, the original inhabitants, from whom the country takes its name; the Arabs who conquered an extensive portion of it during the times of the caliphs; the Bedouins, Jews, Turks, and the French colonists of Algeria, etc. The country which was prosperous under the Carthaginians, was, next to Egypt, the richest of the Roman provinces, and the Italian states enriched themselves by their intercourse with it. In the fifteenth century, however, it became infested with adventurers who made the name of Barbary corsair a terror to commerce, a condition of things finally removed by the French occupation of Algeria.

**Barbary** Ape, a species of ape, or tailless monkey, with greenish-brown hair, of the size of a large cat, remarkable for docility, also called the *magot*. It is common in Barbary and other parts of Africa, and some used to live formerly on Gibraltar Rock, being the only European monkey, though probably not indigenous. It has been the "showman's ape" from time immemorial.

**Bar' becue**, a word of West Indian origin, meaning a hog, or other large animal, roasted whole. In the southern states the word is used to signify any jollification or especially a political festivity.

**Barbel**, a genus of fresh-water fishes of the carp family, distinguished by the four fleshy



filaments growing from the lips, two at the nose and one at each corner of the mouth, forming the kind of beard to which the genus owesits name. The barbel is common in Eu-

#### Barberry

ropean rivers, and runs in weight from 9 to 20 lbs. It gives good sport to the angler, but its flesh is very coarse.

Barber, one whose occupation is to shave or trim the beard, or cut and dress hair. The practise of surgery was formerly a part of the craft, and by an act of Henry VIII, the Company of Barbers was incorporated with the Company of Surgeons-the company being then known as the Barber-surgeons-with the limitation, however, that the surgeons were not to shave or practise "barbery," and the barbers were to perform no higher surgical operation than blood-letting and tooth-drawing. This continued till the time of George II. The signs of the old profession-the pole which the patient grasped, its spiral decoration in imitation of the bandage, and the basin to catch the blood-are still sometimes retained. The barbers' shops, always notorious for gossip, were in some measure the news-centers of classic and mediæval times.

**Barberini** (bår-be-rë'në), a celebrated Florentine family, which, since the pontificate of Maffeo Barberini (Urban VIII, 1623 to 1644), has occupied a distinguished place among the nobility of Rome. During his reign he seemed chiefly intent on the aggrandizement of his three nephews, of whom two were appointed cardinals, and the third Prince of Palestrina.

**Bar' berry**, a genus of shrubs, the common barberry having bunches of small, beautiful red berries, somewhat oval; serrated and



Barberry. a.-Flowering branch; b.-Fruit.

pointed leaves; thorns, three together, upon the branches; and hanging clusters of yellow flowers. The berries nearly approach the tamarind in respect of acidity, and when boiled with sugar make an agreeable preserve, rob, or jelly. They are also used as a dry sweetmeat, and in sugarplums or comfits; are pickled with vinegar, and are used for the garnishing of dishes. The bark is said to have medicinal properties, and the inner bark

#### Barberton

and roots with alum yield a fine yellow dye. The shrub was originally a native of eastern countries, but is now generally diffused in Europe, as also in North America. Numerous other species belong to America and Asia.

**Bar'berton**, the chief mining center of De Kaap gold fields, Transvaal, about 80 mi. from Lydenburg, and 150 to 160 mi. from Delagoa Bay. Pop. about 4,000.

**Bar'bets**, a family of climbing birds with a thick conical beak, having tufts of bristles at its base. Their wings are short and their flight somewhat heavy. They have been divided into three subgenera: The *barbicans*, inhabiting India and Africa, and feeding chiefly on fruit: the *barbets* proper, found in America and Africa, and nearly related to the woodpeckers; and the *puff-birds*, inhabiting America, and feeding on insects.

**Barbette** (bår-bet'), an elevation of earth behind the breastwork of a fortification, from which the artillery may be fired over the parapet instead of through an embrasure. A barbette carriage is a carriage which elevates a gun sufficiently high to permit its being fired over the parapet.

over the parapet. **Barbuda** (bar-bo'da), one of the West Indies, annexed by Britain in 1628; about 15 mi. long and 8 wide: lying n. of Antigua; pop. 800. It is flat, fertile, and healthy. Corn, cotton, pepper, and tobacco are the principal produce, but the island is only partially cleared for cultivation. It is a dependency of Antigua. **Bar'ca**, a division of North Africa, between

**Bar'ca**, a division of North Africa, between the Gulf of Sidra and Egypt, a vilayet of the Turkish Empire, capital Bengazi. It formed a portion of the ancient Cyrenaica, and from the time of the Ptolemies was known as Pentapolis from its five Greek cities. The exports are grain and cattle, with ostrich feathers and ivory from the interior. Next to Bengazi the seaport of Derna is the chief town. The pop. probably does not exceed 300,000.

**Barcarolle** (-rol'), a species of song sung by the barcaruoli, or gondoliers of Venice, and hence applied to a song or melody composed in imitation.

Barcelona (bar-thel-o'na), one of the largest cities of Spain, chief town of the province of Barcelona, and formerly capital of the kingdom of Catalonia; situated on the northern portion of the Spanish Mediterranean coast. It is divided into the upper and lower town; the former modern, regular, stone-built, the latter old, irregular, brick-built. The principal manufactures are cottons, silks, woolens, machinery, paper, glass, chemicals, stoneware, soap; exports: manufactured goods, wine and brandy, fruit, oil, etc.; imports: coal, textile fabrics, machinery, cotton, fish, hides, silks, timber, etc. The city contains a university, several public libraries, a museum, a large arsenal, cannon foundry, etc. Barcelona was, until the twelfth century, governed by its own count, but was afterward united with Arragon. In 1640, with the rest of Catalonia, it placed itself under the French crown; in 1652 it submitted again to the Span-ish government; in 1697 it was taken by the

French, but was restored to Spain at the Peace of Ryswick. Pop. 272,481. The province has an area of 2,968 sq, mi.; pop. 902,970. It is generally mountainous, but well cultivated, and among the most thickly peopled in Spain.

**Barcelona**, a town of Venezuela, near the mouth of the Neveri River, founded in 1671. Pop. 12,785.

**Barciay, ROBERT** (1648-1690), the celebrated apologist of the Quakers, b. at Gordonstown, Moray, Scotland, and educated at Paris, where he became a Roman Catholic. Later he became a Quaker. He published writings to rectify public sentiment in regard to the Quakers. In his travels with William Penn and George Fox through England, Holland, and Germany, to spread the opinions of the Quakers, he was received everywhere with the highest respect.

**Bar-cochba** (bår-ko $\hbar$ 'bå), SIMON, a Jewish impostor, who pretended to be the Messiah, raised a revolt, and made himself master of Jerusalem about 132 A. D., and of about fifty fortified places. Bar-cochba perished in the assault of Jerusalem by the Romans three years after, about 135.

Bard, one of an order among the ancient Celtic tribes, whose occupation was to compose and sing verses in honor of the heroic achievements of princes and brave men, generally to the accompaniment of the harp. Their verses also frequently embodied religious or ethical precepts, genealogies, laws, etc. Their exist-ence and function was known to the Romans two centuries B.C.; but of the Gallic bards only the tradition of their popularity survives. The first Welsh bards of whom anything is extant are Taliesin, Aneurin, and Llywarch, of the sixth century. Edward I is said to have hanged all the Welsh bards as promoters of sedition. The Cambrian Society was formed in 1818 for the preservation of the remains of the ancient literature. The revived Eisteddfodan, or bardic festivals, have been so far exceedingly popular.

**Bardwan'** (or Burdwan'), a division of Bengal, upon the Hugli, comprising the six districts of Bardwan, Hugli, Howrah, Midnapur. Bankura, and Birbhum. Area 13,855 sq. mi; pop. 7,393,954. The district Bardwan has an area of 2,697 sq. mi., and a pop. of 1,391,823. Apart from its products (rice, grain, hemp, cotton, indigo, etc.), it has a noted coal field of about 500 sq. mi. in area, with an annual output of about half a million tons. The town of Bardwan has a fine palace of the Maharajah and a pop. of 34,080.

**Barége** (ba-rāzh'), a light, open tissue of silk and worsted, or cotton and worsted, for women's dresses, originally manufactured near Baréges.

**Bareges** (ba-rāgh), a watering-place, s. of France, dep. Hautes-Pyrénées, about 4,000 ft. above the sea, celebrated for its thermal springs which are frequented for rheumatism, scrofula, etc. The place is hardly inhabited except in the bathing season, June to September.

**Bareilly** (ba-rā'li), a town of Hindustan in 16

the N. W. Provinces, capital of a district of same name. On the outbreak of the Indian mutiny the native garrison took possession of the place, but it was retaken by Lord Clyde in May, 1858. Pop. 121,039. The district has an area of 2.982 so. mi.: pop. 1.040.691.

Barham, RICHARD HARRIS (1788-1845), the author of 2,082 sq. mi.; pop. 1,040,691. Barham, RICHARD HARRIS (1788-1845), the author of the *Ingoldsby Legends*. In 1802 by a coach accident his right arm was crippled for life. He was ordained in 1813, and in 1821 was appointed a minor canon of St. Paul's. He published several novels, and with the commencement of *Bentley's Miscellany* in 1837, he began his inimitable burlesque metrical tales under the nom de plume of Thomas Ingoldsby, which at once became popular from their droll humor, fine irony, and varied and whimsical rhymes.

**Bari** (bär'ē), a seaport, South Italy, on a small promontory of the Adriatic, capital of the province Terra di Bari. It was a place of importance as early as the third century B. C., and has been thrice destroyed and rebuilt. The present town, though poorly built for the most part, has a large Norman castle, a fine cathedral and priory, etc. It manufactures cotton and linen goods, hats, soap, glass, and liquors: has a trade in wine, grain, almonds, oil, etc., and is now an important seaport. Pop. 63,366. The province has an area of 2,280 sq. mi., and is fertile in fruit, wine, oil, etc.; pop. 723,730.

**Bari**, a negro people of Africa, dwelling on both sides of the White Nile, and having Goudokoro as their chief town. They practise agriculture and cattle-rearing. Their country was conquered by Sir Samuel Baker for Egypt. **Baril'ia**, the commercial name for the im-

pure carbonate and sulphate of soda imported from Spain and the Levant. It is the Spanish name of a plant, from the ashes of which and from those of others of the same genus the crude alkali is obtained. On the shores of the Mediterranean the seeds of the plants from which it is obtained are regularly sown near the sea, and these, when at a sufficient state of maturity, are pulled up, dried, and burned in bundles in ovens or in trenches. The ashes, while hot, are continually stirred with long poles, and the saline matter they contain forms, when cold, a solid mass, almost as hard as stone. To obtain the carbonate of soda it is only requisite to lixiviate the barilla in boiling water, and evaporate the solution. British barilla or kelp is a still more impure alkali obtained from burning seaweeds. Soda is now obtained for the most part from common salt.

**Ba'ring Brothers,** the name of a noted British banking firm, the founders of which were Francis and John B., sons of a German named John B., who settled in England in the first half of the eighteenth century. The now celebrated house was established in 1770. Francis B., who was a strong adherent of William Pit, was made a baronet by that minister in 1793. He was succeeded by his eldest son, Sir Thomas B. Sir Francis's second son. Alexander, was in 1353 created Lord Ashburton. Sir Thomas d. in 1848, and was succeeded by his son, Sir Francis Thorn-hill B., who was M. P. for Portsmouth from 1826 to 1865. Under successive Whig governments he held the offices of lord of the treasury, secretary to the treasury, chancellor of the exchequer, and first lord of the admiralty. In January, 1866, he was created Baron Northbrook. He d. in the following September. He was succeeded by his son, the pres-ent Lord Northbrook. Thomas B., M. P. (b. 1800), uncle of the present lord, devoted himself to commerce, and was universally known for many years as the leading partner in the great mercantile firm of B. Brothers. He d. Nov. 18, 1873. Edward Charles B., the then head of the firm, was. in 1885, raised to the peerage as Baron Revelstoke. In 1890, very large amounts being invested in South American securities which had become depreciated, and were not readily realizable, the firm became seriously embarrassed, but by the assistance of a guarantee by the Bank of England and the other principal banks, they were enabled to surmount their difficulties, and thus prevent a commercial catastrophe, the far-reach-ing and ruinous consequences of which no one could estimate. A reconstruction of the firm

then took place. Baring-Gouid (bā-ring-gold'), SABINE, English clergyman and author, b. at Exeter 1834. Educated at Cambridge, he has held several livings in the English church, being now rector of Lew Trenchard, Devon. Among his works are: Iceland, its Scenes and Sagas; Curious Myths of the Middle Ages; The Origin and Development of Religious Belief; Lives of the Saints; Village Sermons; besides the novels: Mehalah. John Herring, Richard Cable, the Gaverocks, etc.; and short stories or novelettes.

**Ba'rium**, the metallic basis of baryta, which is an oxide of barium. It is only found in compounds, such as the common sulphate and carbonate, and was isolated by Davy for the first time in 1808. It is a yellow, malleable metal, which readily oxidizes, decomposes water, and fuses at a low temperature. Its nitrate and chlorate are used in pyrotechny.

nitrate and chlorate are used in pyrotechny. Bark, the exterior covering of the stems of exogenous plants. It is composed of cellular and vascular tissue, is separable from the wood, and is often regarded as consisting of four layers: 1, epidermis or cuticle, which, however, is scarcely regarded as a part of the true bark; 2, the epiphlaum or outer cellular layer of the true bark or cortex; 3, the mesophlaum or middle layer, also cellular; 4, an inner vascular layer, the liber or endophlaum, commonly called bast. Endogenous plants have no true bark. Bark contains many valuable products, as gum, tannin, etc.; cork is a highly useful substance obtained from the epiphlocum; and the strength and flexibility of bast make it of considerable value. Bark used for tanning is obtained from oak, hemlock-spruce, species of acacia growing in Aus-tralia, etc. Angostura bark, Peruvian or cinchova, cinnamon, cascarilla, etc., are useful barks.



**Bark**, Peruvian, is the bark of various species of trees of the genus *Cinchona*, found in many parts of S. A. but more particularly in Peru, and having medicinal properties. It was formerly called *Jesuit's bark*, from its having been introduced into Europe by Jesuits. Its medicinal properties depend upon the presence of *quinine*, which is now extracted from the bark, imported, and prescribed in place of nauseous mouthfuls of bark.

**Bar-le-duc** (bar-l-duk), a town of n. e. France. capital of dep. Meuse, with manufactures of cotton and woolen stuffs, leather, confectionery, etc. Pop. 18,761.

**Barlet' ta**, a seaport in South Italy, province of Bari, on the Adriatic, with a fine Gothic cathedral; it has a considerable export trade in grain, wine, almonds, etc. Pop. 34,775.

**Bar ley**, the name of several cereal plants of the genus *Hordeum*, order *Gramines* (grasses), yielding a grain used as food and also for making mait, from which are prepared beer, porter, and whisky. Barley has been known and cultivated from remote aniquity, and beer was made from it among the



Barley.

Egyptians. The species principally cultivated are two-rowed barley; four-rowed barley; and six-rowed, of which the small variety is the sacred barley of the ancients. Some of these are called *bere or bigg*. In North America the extent of it as a crop is comparatively small, being in Canada, however, relatively greater than in the U. S., and the Canadian barley is of very high quality. In 1895 the U. S. produced about 87,000,000 bushels of barley. Barley is better adapted for cold climates than any other grain, and some of the coarser varieties are cultivated where no other cereal can be grown. Some species of the genus are mere grasses. Pot or Scotch barley is the grain deprived of the husk in a mill. Pearl barley is the grain polished and rounded and deprived of husk and pellicle. Patent barley is the farina obtained by grinding pearl barley. *Barley-water*, a decoction of pearl barley, is used in medicine as possessing emollient, diluent, and expectorant qualities.

**Barley-sugar**, pure sugar melted and allowed to solidify into an amorphous mass without crystallizing.

**Bar'low**, Joel (1754-1812), an American poet, politician, and pamphleteer. After an active and changeful life as chaplain, lawyer, editor, land-agent, lecturer, and consul, he went to Paris and acquired a fortune. On his return to America he was appointed minister plenipotentiary to France (1811), but died near Cracow on his way to meet Napoleon. His principal poem, *The Columbiad*, dealing with American history from the time of Columbus, was published in 1807.

**Barlow**, SAMUEL LATHAM MITCHELL (1826-89), b. in Granville, Mass. At the age of fourteen years he entered a law office, and after studying seven years he set up in business for himself. A trip to Europe in behalf of an Illinois railway, in the year the firm was started brought him \$50,000. The act by which he gained his widest fame was the lawsuit which expelled Jay Gould from the control of the Erie railway after the death of James Fisk, Jr. Mr. Barlow was elected one of the directors of the road under the new management, and was retained as its private counsel. Mr. Barlow was a Democrat, but never held any political office.

**Bar' mecides** (-sidz), a distinguished Persian family, whose virtues and splendor form a favorite subject with Mohammedan poets and historians. Two eminent members of this family were Khaled-ben-Barmek, tutor of Harunal-Rashid, and his son, Yahya, grand vizier of Harun.

**Bar' mecide's Feast**, a phrase proverbial for a feast on imaginary dainties, and originating in the story of the barber's sixth brother, in the *Arabian Nights*.

**Bar'men**, a German city in the Prussian Rhine Province, government of Düsseldorf, and forming a continuation of the town of Elberfeld, in the valley of Barmen. It has extensive ribbon and other textile manufactures: also dye-works, manufactures of chemicals, metal wares, buttons, yarns, iron, machines, pianos, organs, soap, etc. Pop. 116,144.

**Bar' mabas,** the surname given by the apostles to Joses, a fellow laborer of Paul, and, like him, ranked as an apostle. He is said to have founded at Antioch the first Christian community, to have been first bishop of Milan, and to have suffered martyrdom at Cyprus.

Bar' nacle, the name of a family of marine crustaceous animals. They are enveloped by a mantle and shell, composed of five principal valves and several smaller pieces, joined together by a membrane attached to their circumference; and they are furnished with a long, flexible, fleshy stalk or peduncle, provided with muscles, by which they attach themselves to ships' bottoms, submerged timber, etc. They feed on small marine animals. brought within their reach by the water and secured by their tentacula. Some of the

# Barnacle Goose

larger species are edible. According to an old fable these animals produced barnacle geese.

**Barnacle Goose**, a summer visitant of the northern seas, in size rather smaller than the common wild goose, and having the forehead and cheeks white, the upper body and neck black. A fable asserts that the crustaceans called barnacles changed into geese, and various theories have been framed to account for its origin. The Brent Goose is also sometimes called the Barnacle Goose, but the two should be discriminated.

**Barnardo**, THOMAS J., a British philanthropist, founder of the Barnardo Homes for homeless children, where they receive an industrial training, are saved from a possible career of crime, and enabled to achieve an honorable position in life. Dr. Barnardo has also under his direction many separate institutions in the United Kingdom and the colonies, a house for babies, a hospital for children, an immigration depôt in Ontario, and an industrial farm in Manitoba. Dr. Barnardo was born in Ireland, did yeoman service in a cholera epidemic in London, and has been happily termed "The Father of the Don't-live-nowheres."

**Bar' net**, a town of England, in Herts, 11 mi. from London, where was fought in 1471 a battle between the Yorkists and Lancastrians, resulting in the defeat of the latter and the death of Warwick, Edward IV being thus established on the throne. Pop. 4,563.

Barney, JOSHUA (1759-1818), American naval officer. When the American Revolution began Barney was appointed master's mate of the sloop Hornet, fitted out in Baltimore, and in November, 1775, joined Commodore Hop-kins's squadron at Philadelphia. After the fleet had captured New Providence and the Bahamas, it returned to Philadelphia, and Barney was transferred to the sloop Wasp. He was afterward transferred to the frigate Virginia as first officer. After five months confinement in a prison-ship in New York, he was exchanged, and again captured, when he was sent for imprisonment to England, but escaped in the undress uniform of a British officer. Eventually he found his way back to Philadelphia, where he was placed in command of the ship Hyder Ali. While convoying a fleet of merchantmen down the Delaware River he captured the British ship General Monk, after an engagement of twenty-six minutes. Though only twenty-three years of age, he was promoted by Congress to the rank of commodore, and received from the state of Pennsylvania a gold-hilted sword. In the War of 1812 Barney was appointed commander of the gunboat flotilla, organized for the defense of Chesapeake Bay. On Aug. 26, 1814, at the battle of Bladensburg he did all the fighting of that day. Here he was wounded and taken prisoner, exchanged six weeks later, and at once resumed his command. For his services at this battle the city of Washington voted him an elegant sword.

**Barns' ley**, a town of England, W. Riding of Yorkshire. Its staple industries are the manufacture of linens, iron, and steel, and there are

## Barnum

numerous collieries in the neighborhood. Pop. 35,427.

Barnum, PHINEAS TAYLOR (1810-1891), American showman, b. at Bethel, Conn. His father was tailor, farmer, and tavernkeeper in turn. At thirteen young Barnum was employed in a country store; and about five years afterward, went largely into the lottery business. When only nineteen he married clandestinely, and then moved to Danbury, where he edited The Herald of Freedom, and was imprisoned sixty days for a libel. In 1834 he removed to New York, where hearing of Joice Heth, the reputed nurse of General Washington, he bought her for \$1,000, and with the aid of wholesale advertising, exhibited her to considerable profit. He continued in the show business from 1836 to 1839, but reduced again to poverty, he sold Bibles, exhibited negro dancers, and wrote for newspapers, until in 1841 he bought Scudder's American Museum in New York, which he raised at once to prosperity by exhibiting a Japanese mermaid. made of a fish and monkey, a white negress, a woolly horse, and finally a noted dwarf (Charles S. Stratton of Bridgeport), styled Gen. Tom Thumb, whom he exhibited in Europe in 1844. In 1847 he offered Jenny Lind \$1,000 a night for 150 nights, and received \$700,000-the concert tickets being sold at auction, in one case as high as \$650 for a single ticket. He built a villa at Bridgeport, in imitation of the Brighton Pavilion, and engaged in various speculations. one of which-a clock factory-made him bankrupt. Settling with his creditors in 1857. he engaged anew in his career of audacious enterprises, and made another fortune. In 1866 he was a candidate for a seat in Congress. but was unsuccessful. His Autobiography (1854, since greatly enlarged) has the merit at least of frankness. In 1865 he published The Humbugs of the World; in 1869, Struggles and Triumphs; and in 1883, Money-getting. In 1868 he relinquished the business of showman, resuming it. however, in 1871, when he organized a museum, menagerie, circus, etc., which required 500 men and horses to transport it through the country. For his hippodrome in New York he purchased for \$165,000 from Messrs. Sanger, London, in 1874, a duplicate of the whole plant for the pageant "Congress of Monarchs." His "Greatest Show on Earth " required 100 railway cars for its conveyance, every one of which was his own property. In 1879 he estimated the number of his patrons up to date as 90,000,000. In 1882 the receipts in a single day for his Great Show when in Boston amounted to over \$15,-000; for ten days, over \$105,000. In 1882 he purchased for \$10,000 from the London Zoological Society the elephant "Jumbo." Mr. Barnum had his own statue prepared while he was alive. The statue is of bronze, about 7 ft. in height, and represents him seated in a great arm-chair. It was made in Europe, on his personal order, and, on arrival in America, in 1887. from Bremen, was packed away in one of the great storage warehouses of New York, with instructions that no one should be permitted to see it until after his death.



**Baro'da**, a non-tributary state, but subordinate to the Indian government; situated in the north of the Bombay presidency. It consists of a number of detached territories in the province of Guzerat, and is generally level, fertile, and well cultivated, producing luxuriant crops of grain, cotton, tobacco, opium, sugar-cane, and oil-seeds. There is a famous breed of large white oxen used as draught cattle. Area 8,226 sq. mi.; pop. 2,415,396. Baroda, the capital, is the third city in the Bombay presidency. Pop. 116,420 (including troops in the adjoining cantonment).

**Barometer**, an instrument for determining atmospheric pressure. Experimenting with a closed tube filled with mercury inverted in a cup of the same metal, Torricelli noted that the pressure of the atmosphere supports a column of mercury 30 inches high. Pascal repeated and verified the experiment (1645). Perrier (1656) discovered that the height of the mercury varied with the weather. The cistern barometer consists of a glass tube 33 inches long, bore one third inch. The tube, hermetically sealed at the top, curves up at the bottom terminating in a glass bulb open to the atmosphere. Purified mercury fills the tube, and a scale marks the height of the column. In general, the rising of the mercury presages fair weather, and its falling the contrary, a great and sudden fall being the usual presage of a storm.

The siphon barometer consists of a bent tube, generally of uniform bore, having two unequal legs, the longer closed, the shorter open. A sufficient quantity of mercury having been introduced to fill the longer leg, the instrument is set upright, and the mercury takes such a position that the difference of the levels in the two legs represents the pressure of the atmosphere. In the best siphon barometers there are two scales, one for each leg, the divisions on one being reckoned upward, and on the other downward from an intermediate zero point, so that the sum of the two readings is the difference of levels of the mercury in the two branches.

The wheel barometer is the one that is most commonly used for domestic purposes. It is far from being accurate, but it is often preferred for ordinary use on account of the greater range of its scale, by which small differences in the height of the column of mercury are more easily observed. It usually consists of a siphon barometer, having a float resting on the surface of the mercury in the open branch, a thread attached to the float passing over a pulley, and having a weight as a counterpoise to the float at its extremity. As the mercury rises and falls, the thread and weight turn the pulley, which again moves the index of the dial.

The mountain barometer is a portable mercurial barometer with a tripod support and a long scale for measuring the altitude of mountains. To prevent breakage, through the oscillations of such a heavy liquid as mercury, it is usually carried inverted, or it is furnished with a movable basin and a screw, by means of which the mercury may be forced up to the top of the tube. For delicate operations, such as the measurement of altitudes, the scale of the barometer is furnished with a nonius or vernier, which greatly increases the minuteness and accuracy of the scale. In exact barometric observations two corrections require to be made, one for the depression of the mercury in the tube by capillary attraction, the other for temperature, which increases or diminishes the bulk of the mercury. In regard to the measurement of heights the general rule is to subtract the ten-thousandth part of the observed altitude for every degree of Fahrenheit above 320.

In the aneroid barometer, as its name implies (Gr. a, not, neros, liquid), no fluid is employed. the action being dependent upon the susceptibility to atmospheric pressure shown by a flat circular metallic chamber from which the air has been partially exhausted, and which has a flexible top and bottom of corrugated metal plate. By an ingenious arrangement of springs and levers the depression or elevation of the surface of the box is registered by an index on the dial, by which means it is also greatly magnified, being given in inches to correspond with the mercurial barometer. Aneroids are, however, generally less reliable than mercurial barometers, with which they should be frequently compared.

**Barque** (bärk), a three-masted vessel of which the foremast and mainmast are squarerigged, but the mizzenmast has fore-and-aft sails only.

**Barquesimeto** (bår-kā-sē-mā'tō), a city in the north of Venezuela, capital of the province of Barquesimeto. Pop. 31,476. It was founded in 1522, named New Segovia, and destroyed by earthquake in 1812.

**Bar'ra'** (or Bar), a small kingdom in Africa. near the mouth of the Gambia. The Mandingoes, who form a considerable part of the inhabitants, are Mohammedans and the most civilized people on the Gambia. Pop. 200,000. The coast here belongs to Great Britain.

**Barra**, an island of the Outer Hebrides, w. coast of Scotland, belonging to Inverness-shire. On the w. coast the Atlantic, beating with all its force, has hollowed out vast caves and fissures. Large herds of cattle and flocks of sheep are reared on the island. Pop. 2,365: area 348 sq. mi.

**Barrackpur** (pör'), a town and military cantonment, Hindustan, on the left bank of the Hugli, 10 miles n.n.e. of Calcutta. Here occurred the first outbreak of the Indian mutiny. Pop. 56,627.

**Barranquilla** (bår-rån-kēl'yå), a town of South America. in Colombia, on a branch of the river Magdalena, near its entrance into the Caribbean Sea, connected by rail with the seaport Sabanilla. Pop. 11,595.

**Barras** (bá-rii), PAUL FRANÇOIS JEAN NICH-OLAS, Comte de (1755-1829), member of the French national convention and of the executive directory. After serving in the army in India and Africa he joined the revolutionary party and was a deputy. He took part in the attack upon the Bastile and upon the Tuileries, and voted for the death of Louis XVI. On Feb. 4, 1795, he was elected president of the convention, and on Oct. 5, Barras for a second time received the chief command of the forces of the convention. From 1797 he governed absolutely until June 13, 1799, when Siéyès entered the directory, and in alliance with Bonaparte procured his downfall. He afterward resided at Brussels, Marseilles, Rome, and Montpellier under surveillance, returning to Paris only after the restoration of the Bourbons. His memoirs were suppressed and seized, but were published recently.

Barre, Washington co., Vt., the seat of Goddard Seminary. Pop. 6,812.

**Barren Grounds,** a large tract in the n.w. territories of Canada, extending northward from Churchill River to the Arctic Ocean between Great Bear and Great Slave Lake and Hudson's Bay. It largely consists of swamps, lakes, and areas of bare rock with dwarf birches and willows in certain parts. The reindeer and musk-ox are among the animals.

**Barrett**, LAWRENCE, actor, b. 1838, in Paterson, N. J. He made his *début* at Detroit, Mich., in 1853, as "Murad," in the drama of the *French Spy*. In 1856 he appeared at Burton's theater in New York City, as "Sir Thomas Clifford," in *The Hunchback*. In 1861, at the beginning of the Civil War, Mr. Barrett for a time served as a captain of a company of Massachusetts infantry. Retiring from the army, he again acted in Washington, Philadelphia, and New York City. In the lastnamed place he was advanced to performing "Othello" to the "Iago" of Edwin Booth. In 1867 he first appeared as a star actor in San Francisco. Returning to New York City, he played with Mr. Booth in alternate parts at Booth's theater. During 1873-74 he starred in the large cities of the Union, and in 1875 renewed his connections with Booth in New York City. Later he appeared in *King Lear, Yorick's Lore*, and Boker's *Francesca da Rimini*. For some years he traveled through the U. S. in company with Mr. Booth. Mr. Barrett has visited Europe several times.

**Barrier Reef**, a coral reef which extends for 1,260 mi. off the n.e. coast of Australia, at a distance from land ranging from 10 to 100 mi. In sailing from Sydney through Torres Straits vessels have the choice of the inner and outer routes; the former, though narrow, gives a channel of about 12 fathoms deep throughout, and protected from the sea by the reefs themselves; the outer channel is less accurately surveyed and still dangerous.

**Barrios**, JUSTO RUFINO (1835-1885), a Guatemalan statesman. His rule as president was wise and beneficent and included a projected union of the Central American Republics. He was killed in battle with Salvadorean troops.

**Barron**, JAMES (1769–1851), American naval officer. As a boy he became connected with seamanship, was made lieutenant in the navy in 1798, captain in 1799, and made commodore, in command of the *Chesapeake*, 1807. He sailed

out and was met by the British frigate Leopard, whose captain demanded the surrender of several alleged British deserters from among the American crew. To this demand Barron demurred, and the Leopard opened fire, killing three and wounding eighteen of the Chesapeake's men. The American ensign was hauled down, and the alleged deserters were carried away on the British vessel. The British government promptly repudiated the action of the captain of the *Leopard*, the deserters were restored, and a monetary indemnity paid to our government. Barron thereafter was tried by court-martial and suspended from rank and pay for five years. On the expiration of this term he was kept on shore duty. In 1820 Commodore Decatur was challenged by Barron to fight a duel, in which Decatur was killed, and Barron wounded.

**Bar'row**, a river in the s. e. of Ireland, province Leinster. It is next in importance to the Shannon, and is navigable for vessels of 200 tons for 25 mi. above the sea.

**Bar'row-in-Fur'ness**, a seaport and parliamentary borough of Lancashire. England. Its prosperity is due to the mines of red hematite iron-ore which abound in the district, and to the railway rendering its excellent natural harbor available. It has several large docks; besides graving-docks, a floating-dock capable of receiving vessels of 3,000 tons, a large timber pond, etc. There is an extensive trade in timber, cattle, grain, and flour: and iron-ore and pig-iron are largely shipped. It has numerous blast-furnaces, and one of the largest Bessemersteel works in the world. Besides iron-works a large business is done in ship-building, the making of railway wagons, and rolling stock, ropes, sails, bricks, etc. Pop. 51,712.

**Bar'rows**, mounds of earth or stones raised to mark the resting-place of the dead, and distinguished, according to their shape, as *long*, *boxl*, *bell*, *cone*, *broad* barrows. The practise of barrow-burial is of unknown antiquity and almost universal. barrows being found all over America, Europe, in Northern Africa, Asia Minor, Afghanistan, and Western India. In barrows of later date the remains are generally enclosed in a stone cist. Frequently cremation preceded the erection of the barrow, the ashes being enclosed in an urn or cist. A detailed description of an ancient barrow-burial is given in the Anglo-Saxon poem *Beavulf*, and the accounts of the obsequies of Hector and Achilles in the *liad* and *Odyssey* are well known.

**Barrow Strait**, the connecting channel between Lancaster Sound and Baffin's Bay on the e. and the Polar Ocean on the w. Of great depth, with rocky and rugged shores. Named after Sir John Barrow (1764-1848), a British traveler.

**Bar'ry**, CHARLES (1705-1860), an English architect, b. in London 1795. After executing numerous important buildings, such as the Reform Club-house, London, St. Edward's School, Birmingham, etc., he was appointed architect of the new Houses of Parliament at Westminster, a noble pile, with the execution of which he was occupied for more than twenty-

four years. His son, EDWARD MIDDLETON, (1830-1880), was also a distinguished architect.

Barry, JOHN (1745-1803), naval officer, b. in Ireland. He was apprenticed to seamanship, and became master of a vessel. At the beginning of the Revolution he offered his services to this country, and in 1776 became commander of the Lexington, and captured the British tender *Edward*. He was transferred to the command of the *Effingham*. In the winter of 1776-77, he assisted at the battle of Trenton with some heavy artillery. In 1777, Barry captured a British war schooner in the Delaware River. In 1778 he commanded the Ra*kigh*, which was pursued and driven on shore by a British squadron. Later he was trans-ferred to the *Alliance*, and in a severe engagement captured the Atalanta and Trepassy. He was senior officer, with the rank of commodore in the reorganized navy in 1794.

Bar' sabas, son of Alpheus, brother of James the Less and of Jude, and one of the candidates for the apostolical office left vacant by Judas Iscariot.

Bart (Baert or Barth) (bärt), JEAN, a famous French sailor, b. at Dunkirk, 1650, the son of a poor fisherman. He became captain of a privateer, and after some brilliant exploits was appointed captain in the royal navy. In recognition of his further services he was made commodore. He made the navy of the nation everywhere respected, and furnished some of the most striking chapters in the romance of naval warfare. After the peace of Ryswick he lived quietly at Dunkirk, and d. there while equipping a fleet to take part in the War of the Spanish Succession, 1702.

Barth (bärt), HEINRICH, African traveler, b. at Hamburg 1821, d. in 1865. He graduated at the University of Berlin as Ph.D. in 1844; and set out in 1845 to explore all the countries bordering on the Mediterranean. His explorations, which extended over an area of about 2,000,000 sq. mi., determined the course of the Niger and the true nature of the Sahara

Barthé'lmy - Saint - Hilaire (bar-tāl-mē), JULES (1805-1887), French scholar and statesman. He was professor of Greek and Latin philosophy in the College of France, but re-signed the chair after the coup d'état of 1852 and refused to take the oath; was reappointed 1862; in 1869 was returned to the Corps Législatif; after the revolution was a member of the National Assembly; was elected senator for life in 1875. He published a translation of Aristotle, and works on Buddhism, Mohammed and Mohammedanism, the Vedas, etc.

Bartholdi (bår-tol'dē) AUGUSTE, a French sculptor, b. 1833; best known as the artist of the colossal statue of Liberty now overlooking the harbor of New York.

Barthol'omew, the apostle, is probably the same person as Nathanael, mentioned in the Gospel of St. John as an upright Israelite and one of the first disciples of Jesus. He is said to have taught Christianity in the south of Arabia.

Bartholomew's Day, ST., a feast of the Church of Rome, celebrated (August 24) in honor of St. Bartholomew. What is known as the Massacre of St. Bartholomew was the slaughter of the French Protestants which began Aug. 24, 1572, by secret orders from Charles IX at the instigation of his mother, Catherine de Medici, and in which, according to Sully, 70,000 Huguenots, including women and children, were murdered throughout the country. During the minority of Charles and the regency of his mother a long war raged in France between the Catholics and the Huguenots, the leaders of the latter being the Prince of Condé and Admiral Coligny. In 1570 overtures were made by the court to the Huguenots, which resulted in a treaty of peace. This treaty blinded the chiefs of the Huguenots, particularly the Admiral Coligny, who was wearied with civil war. The king appeared to have entirely disengaged himself from the influence of the Guises and his mother; he invited Coligny to his court. and honored him as a father. The most artful means were employed to increase this delu-sion. The sister of the king was married to the Prince de Béarn (1572) in order to allure the most distinguished Huguenots to Paris. On August 22 a shot from a window wounded the admiral. The king hastened to visit him, and swore to punish the author of the villainy; but on the same day he was induced by his mother to believe that the admiral had de-signs on his life. The following night Catharine held the bloody council, which fixed the execution for the night of St. Bartholomew, Aug. 24, 1572. After the assassination of Coligny a bell from the tower of the royal palace at midnight gave to the assembled companies of burghers the signal for the general massacre of the Huguenots. The Prince of Condé and the King of Navarre saved their lives by going to mass and pretending to embrace the Catholic religion. By the king's orders the massacre was extended throughout the whole kingdom, and the horrible slaughter continued for birthirty days in almost all the provinces. Bartholomew's Hospital, ST., one of the

great hospitals of London, formerly the priory

of St. Bartholomew, and made a hospital by Henry VIII in 1547. On an VIII in 1547. average 6,000 patients are annually admitted to the hospital, while about 100,-000 out-patients are relieved by it. A medical school is attached to it.

Bar'tizan, a small overhanging turret pierced with one or more apertures for archers, projecting generally from the angles on the top of a tower, or from the para-pet, or elsewhere, as in a mediæval castle.

Bartolini (bar-to-lē'nē), LORENZO (1778-1850), a Bartizan. celebrated Italian sculptor, born at Florence. He studied and worked in Paris, and was pat-



ronized by Napoleon. Among his greater works may be mentioned his groups of *Charity* and *Hercules* and *Lycas*, a colossal bust of Napoleon, and the beautiful monument in the cathedral of Lausanne, erected in memory of Lady Stratford Canning. Bartolini ranks next to Canova among modern Italian sculptors.

**Bartolozzi** (lot'sē), FRANCESCO (1725-1813), a distinguished engraver, born at Florence. He later went to London, and Lisbon, Portugal.

later went to London, and Lisbon, Portugal. **Barton, BERNARD**, known as the Quaker poet, b. in London 1784, d. 1849. His poetry, though deficient in force, is pleasing, fluent, and graceful.

Barton, CLARA, philanthropist, b. 1826, in Oxford, Mass. She first went to school in Clinton, N. Y.; became a teacher and founded a free school in Bordentown, N. J., became clerk in the U.S. patent office, 1854. When the Civil War began she devoted herself to the care of wounded soldiers on the battlefield; and in 1864 had charge of the hospitals at the front of the Army of the James. In 1865 she visited Andersonville, Ga., to mark the graves of the Union soldiery. During the war between Germany and France she volunteered her service, and was decorated with the golden cross of Baden and the iron cross of Germany. The American Red Cross Society was organized in 1881, and she became its president, and represented the U.S. at the Red Cross conference in Geneva, Switzerland, in 1884. She was also delegate to the international peace convention at Geneva, in 1884, and a special commissioner for foreign exhibits at the New Orleans exhibition. In 1883 the U.S. Senate committee on foreign relations requested her to prepare a *History of the Red Cross.* This book was published at the government print-ing office, Washington.

Bartram, JOHN (1699-1777), botanist, b. in Chester co., Pa. After studying medicine and surgery, he became interested in the study of plants. He was the first to form a botanic garden for American plants. The garden still contains some fine old trees. Mr. Bartram went on his first extensive botanical expedition, joining a mission to the Six Nations of Indians at Onondaga, and afterward traveling to Oswego, and to the partly explored shores of Lake Ontario, 1743. He published his Ob-servations on the Inhabitants, Climate, Soil, etc., from Pennsylvania to Onondaga, Oswego, and the Lake Ontario, etc. (1751). His Journal of Travels was published in 1766. Mr. Bartram contributed several papers to the American Philosophical Society. He was a friend of Mr. Bartram supported his Dr. Franklin. family by farming, and quarried the stones for the house on the Schuylkill, which he built, and which is still standing. His son, William Bartram (1730-1823) illustrated Barton's Ele-ments of Botany, and was the first to make known many curious and beautiful American plants.

**Baruch** (bā'ruk), a Hebrew scribe, friend and assistant to the prophet Jeremiah. One of the apocryphal books bears the name of Baruch. **Barwood**, a dyewood obtained from a tall tree of West Africa. It is chiefly used for giving orange-red dyes on cotton yarns. See *Camwood*.

Bary'ta, oxide of barium, called also heavy earth, from its being the heaviest of the earths. It is generally found in combination with sulphuric and carbonic acids, forming sulphate and carbonate of baryta, the former of which is called *heavy-spar*. Baryta is a gray powder. has a sharp, caustic, alkaline taste, and a strong affinity for water, and forms a hydrate with that element. It forms white salts with the acids, all of which are poisonous except the sulphate. Several mixtures of sulphate of baryta and white lead are manufactured, and are used as white pigments, or it may be used alone. Carbonate of baryta, which in the natural state is known as witherite, is also used as the base of certain colors. The nitrate is used in pyrotechny, in the preparation of green fireworks.

**Basalt** (ba-salt'), a well-known igneous rock occurring in the ancient trap and the recent volcanic series of rocks, but most abundantly in the former. It is a fine-grained, heavy, crystalline rock, consisting of felspar, augite, and magnetic iron, and sometimes contains a little olivine. Basalt is amorphous, columnar, tabular, or globular. The columnar form is straight or curved, perpendicular or inclined. sometimes nearly horizontal; the diameter of the columns from 3 to 18 in., sometimes with transverse semispherical joints, in which the convex part of one is inserted in the concavity of another; and the height from 5 to 150 ft. The forms of the columns generally are pentagonal, hexagonal, or octagonal. When decomposed it is found also in round masses, either spherical or compressed and lenticular. These rounded masses are sometimes composed of concentric layers, with a nucleus, and sometimes of prisms radiating from a center. Fingal's Cave, in the island of Staffa, furnishes a remarkable instance of basaltic columns. The pillars of the Giant's Causeway, Ireland, composed of this stone, and exposed to the roughest sea for ages, have their angles as perfect as those at a distance from the waves. Basalt often assumes curious and fantastic forms, as for example, those masses popularly known as "Sampson's Ribs" at Arthur's Seat, Edin-burgh, and "Lot" and "Lot's Wife" near the s. coast of St. Helena.

**Baseball**, a game played with a bat and ball which has obtained a national character in the U. S. It is played by nine players a side. A diamond-shaped space of ground, 90 feet on the side, is marked out, the corners being the "bases." One side takes the field, and the other sends a man to bat. When the field side take their places the "pitcher," standing inside the ground near the center and in front of the batsman, delivers a ball to the batsman, who stands at the "home base," and who tries to drive it out of the reach of the fielders, and far enough out of the field to enable him to run round the bases, which scores a run. If he

#### Basedow

and may be followed by another batsman. If he is touched by the ball he is out, and when three on his side are put out, the field side take the bat. Nine of these innings makes a game, which the highest score wins. The bat is of a cylindrical shape, not more than 2½ inches in diameter nor more than 42 inches long. The ball is about 9 inches in circumference and weighs not less than 5 ounces. There are now several professional leagues of baseball clubs in the U. S., the leading one of which is the National League. Nearly every college in America has its baseball team, but these players are amateurs.

**Basedow** (bā'ze-dō), JOHN BERNHARD (1723-1790), German educationalist. The chief feature of Basedow's system is the full development of the faculties of the young at which he aspired, in pursuance of the notions of Locke and Rousseau.

Basel (ba'zl), a canton and city of Switzerland. The canton borders on Alsace and Baden, has an area of 177 sq. mi. and a pop. of 144,283, nearly all speaking German. It is divided into two half-cantons. The city of Basel is 43 mi. n. of Berne, and consists of two parts on opposite sides of the Rhine, and communicating by three bridges, one of them an ancient wooden structure; the older portions are irregularly built with narrow streets; has an ancient cathedral, founded 1010, containing the tombs of Erasmus and other eminent persons; a university, founded in 1459; a seminary for missionaries; a museum containing the valuable public library, pictures, etc. The industries embrace silk ribbons, tanning, paper, aniline dyes, brewing, etc. At Basel was signed the treaty of peace between France and Prussia, April 5, and that between France and Spain, July 22, 1795. Pop. 75,114.

**Basel**, Council of, a celebrated ecumenical council of the church convoked by Pope Martin V and his successor Eugenius IV. It was opened Dec. 14, 1431. The objects of its deliberations were to extirpate heresies (that of the Hussites in particular), to unite all Christian nations under the Catholic church, to put a stop to wars between Christian princes, and to reform the church. It got into a dispute with the pope, declared him guilty of contumacy and deposed him. It sat until May 4, 1449, but declined in importance.

**Base-line**, in surveying, a straight line measured with the utmost precision to form the starting point of the triangulation of a country or district.

**Bashi-Bazooks'**, irregular troops in the Turkish army. They are mostly Asiatics, and have had to be disarmed several times by the regular troops on account of the barbarities by which they have rendered themselves infamous.

**Basic Slag,** the slag or refuse matter which is got in making basic steel, and which, from the phosphate of lime it contains, is a valuable fertilizer.

**Bas'il**, a labiate plant, a native of India, much used in cookery, especially in France, and known more particularly as sweet or common basil.

**Basil**, ST., called the Great, one of the Greek fathers, was b. in 329 and made, in 370, Bishop of Cæsarea in Cappadocia, where he d. in 370. The Greek church celebrates his festival January 1. The vows of obedience, chastity, and poverty framed by St. Basil are essentially the rules of all the orders of Christendom.

**Basil** ica, originally the name applied by the Romans to their public halls, either of justice. of exchange, or other business. The plan of the basilica was usually a rectangle divided into aisles by rows of columns, the middle aisle being the widest, with a semi-circular apse at the end, in which the tribunal was placed.

**Basilica' ta** (also called Potenza), an Italian province, extending north from the Gult of Taranto, and corresponding pretty closely with the ancient Lucania. Area 4,122 sq. mi.; pop. 459,580. Potenza (pop. 20,780) is the capital.

**Bas' illsk**, a fabulous creature formerly believed to exist, and variously regarded as a kind of serpent, lizard, or dragon, and sometimes identified with the cockatrice. It inhabited the deserts of Africa, and its breath, and even its look, was fatal. The name is now



The Mythical Basilisk.

applied to a genius of saurian reptiles belonging to the family Iguanidæ, distinguished by an elevated crest or row of scales, erectible at pleasure, which, like the dorsal fins of some fishes, run along the whole length of the back and tail. The miterd or hooded basilisk is especially remarkable for a membranous bag at the back of the head, of the size of a small hen's egg, which can be inflated with air at pleasure. The other species have such hoods also, but of a less size. To this organ they owe their name, which recalls the basilisk of fable, though in reality they are exceedingly harmless and lively creatures. **Basil'ius 1** (820-886). a Macedonian, em-

**Basil'ius 1** (820-886), a Macedonian, emperor of the East. Though he had worked his way to the throne by a series of crimes, he proved an able and equitable sovereign. The versatility, if not the depth of his intellect, is strikingly displayed in his exhortations to his son Leo, which are still extant.

**Basilius II** (958-1025), emperor of the East. He began to reign in conjunction with his brother Constantine, 975. His reign was almost a continued scene of warfare, his most important struggle being that which resulted in the conquest of Bulgaria, 1018.

**Ba'sin**, in physical geography, the whole tract of country drained by a river and its tributaries. The line dividing one river basin from another is the water-shed, and by tracing the various water-sheds we divide each country into its constituent basins. The basin of a loch or sea consists of the basins of all the rivers which run into it. In geology a basin is any dipping or disposition of strata toward a common axis or center, due to upheaval and subsidence. It is sometimes used almost synonymously with "formation" to express the deposits lying in a certain cavity or depression in older rocks. The "Paris basin" and "London basin" are familiar instances.

**Bas' kerville**, JOHN (1706-1775), celebrated English printer and type founder. From his press came highly prized editions of ancient and modern classics, Bibles, prayer-books, etc., all beautifully printed works.

**Basking-shark**, a species of shark, so named from its habit of basking in the sun at the surface of the water. It reaches the length of forty feet, and its liver yields a large quantity of oil. It frequents the northern seas, and is known also as the sail-fish or sun-fish.

Basques (basks) (or Biscayans), a remarkable race of people dwelling partly in the s.w. corner of France, but mostly in the n. of Spain adjacent to the Pyrenees. They are probably descendants of the ancient Iberi, who occupied Spain before the Celts. They preserve their ancient language, former manners, and national dances, and make admirable soldiers, especially in guerrilla warfare. The Basques, who number about 600,000, occupy in Spain the provinces of Biscay, Guipuzcoa, and Alava; in France parts of the departments of the upper and lower Pyrenees, Ariege, and upper Garonne.

**Bas-relief** (b'i'rē-lēf or bas'rē-lēf) (bassrelief, low-relief), a mode of sculpturing figures on a flat surface, the figures having a very slight relief or projection from the surface. It is distinguished from *haut-relief* (alto*rilievo*), or high-relief, in which the figures stand sometimes almost entirely free from the ground. Bas-relief work has been described as "sculptured painting" from the capability of disposing of groups of figures and exhibiting minor adjuncts, as in a painting.

Bass (bas), the name of a number of fishes of several genera, but originally belonging to a genus of sea-fishes of the perch family, distinguished from the true perches by having the tongue covered by small teeth and the preoperculum smooth. The only British species, called also sea-dace, and from its voracity sea-wolf, resembles somewhat the salmon in shape, and is much esteemed for the table, weighing about 15 lbs. The striped bass, an American species, weighing from 25 to 30 lbs., is much used for food, and is also known as rock-fish. Both species occasionally ascend rivers, and attempts have been made to cultivate British bass in fresh-water ponds with success. Two species of black bass, American fresh-water fishes, are excellent as food and give fine sport to the angler. The former is often called the large-mouthed black bass, from the size of its mouth. Both make nests and take great care of their eggs and young. The sea bass is an American fish of the perch family, weighing 2 to 3 lbs.

**Bass** (bås), The; a remarkable insulator traprock, at the mouth of the Firth of Forth, Scotland, of a circular form, about one mile in circumference, rising majestically out of the sea to a height of 313 ft. It pastures a few sheep, and is a great breeding place of solan-geese.

**Bass**, MICHAEL THOMAS (1799–1884), an English brewer, head of the famous firm of Bass & Co., founded in 1777. For many years the firm has been extending its connections, and now employ about 3.000 persons, with an average annual turnover of \$12,000,000. B. represented Derby in the Liberal interest from 1848 to 1883. His benefactions have been very numerous in the parish of Burton and in Derby. He more than once declined a baronetcy and a peerage. The title of Baron Burton was conferred on his son in 1886.

**Bassa' no,** a commercial city of North Italy, province of Vicenza. Near Bassano, Sept. 8, 1796, Bonaparte defeated the Austrian general Wurmser. Pop. 4,897.

**Bassa no** (from his birthplace; real name Giacomo da Ponte), an Italian painter, b. 1510, d. 1592. He painted historical pieces, landscapes, flowers, etc., and also portraits; and left four sons, who all became painters, Francesco being the most distinguished.

**Bassein** (bas-sān'), a town in Lower Burmah, province of Pegu, on both banks of the Bassein river, one of the mouths of the Irrawaddy, and navigable for the largest ships. It has considerable trade, exporting large quantities of rice, and importing coal, salt, cottons, etc. Pop. 30,177. Bassein District has an area of 7,047 sq. mi. and a pop. of 389,419.

**Basseterre** (bös-tār), two towns in the West Indies. 1, Capital of the island of St. Christopher's, at the mouth of a small river, on the south side of the island. Trade considerable. Pop. 9,097. 2, The capital of the island of Guadaloupe. It has no harbor, and the anchorage is unsheltered and exposed to a constant swell. Pop. 10,649.

**Bass'ia**, a genus of tropical trees found in the East Indies and Africa. One species is supposed to be the sheat-tree of Park, the fruit of which yields a kind of butter that is highly valued, and forms an important article of commerce in the interior of Africa. There are several other species, of which the Indian oil-tree, and the Indian butter-tree, are wellknown examples, yielding a large quantity of oleaginous or butyraceous matter. The wood is as hard and incorruptible as teak.

**Bassoon'**, a musical wind instrument of the reed order, blown with a bent metal mouthpiece, and holed and keyed like the clarinet. Its compass comprehends three octaves rising from B flat below the bass staff. Its diameter at bottom is 3 inches, and for convenience of carriage it is divided into two or more parts, whence its Italian name fagotto, a bundle. It serves for the bass among wood wind instruments, as hautboys, flutes, etc.

**Bass' ora** (or Basrah), a city in Aslatic Turkey, on the w. bank of the Shat-el-Arab (the united stream of the Tigris and Euphrates),

about 50 mi. from its mouth, and nearly 300 s. e. of Bagdad. The chief exports are, dates, camels and horses, wool and wheat; imports: coffee, indigo, rice, tissues, etc. In the eighteenth century the inhabitants were estimated at 150,000; they are now about 6,000. The ruins of the ancient and more famous Bassora founded by Caliph Omar in 636, at one time a center of Arabic literature and learning and regarded as "the Athens of the East"—lie about 9 mi. s. w. of the modern town.

**Bass Strait**, a channel beset with islands, which separates Australia from Tasmania, 120 mi. broad, discovered by George Bass, a surgeon in the royal navy, in 1798.

**Basswood Bass**, the American lime tree or linden, a tree common in N. A., yielding a light, soft timber, used for building boats and canoes.

**Bast,** the inner bark of exogenous trees, especially of the lime or linden, consisting of several layers of fibers. The manufacture of bast into mats, ropes, shoes, etc., is in some districts of Russia a considerable branch of industry, bast mats, used for packing furniture, covering plants in gardens, etc., being exported in large quantities. Though the term is usually restricted, many of the most important fibers of commerce, such as hemp, flax, jute, etc., are the products of bast or liber. **Bastia** (bàs-tẽ'à), the former capital of the

**Bastia** (bås-tē'à), the former capital of the island of Corsica, upon the n.e. coast, 75 mi. n.e. of Ajaccio, with some manufactures, a considerable trade in hides, soap, wine, oil, pulse, etc. Pop. 23,397.

**Bastiat** (bas-tē-à), FREDERIC (1801-1850), French economist and advocate of free trade. He became acquainted with Cobden and the English free traders, whose speeches he translated into French.

Bastille (bas-tel'), a French name for any strong castle provided with towers, but as a proper name, the state prison and citadel of Paris, which was built about 1370 by Charles V. It was ultimately used chiefly for the confinement of persons of rank who had fallen victims to the intrigues of the court or the ca-price of the government. The capture of the Bastille by the Parisian mob, July 14, 1789, was the opening act of the Revolution. On that date the Bastille was surrounded by a tumultuous mob, who first attempted to negotiate with the governor Delaunay, but when these negotiations failed, began to attack the fortress. For several hours the mob continued their seige without being able to effect anything more than an entrance into the outer court of the Bastille; but at last the arrival of some of the Royal Guard with a few pieces of artillery forced the governor to let down the second drawbridge and admit the populace. The governor was seized, but on the way to the townhall, he was torn from his captors and put to death. The next day the destruction of the Bastille commenced. Not a vestige of it exists, but its site is marked by a column in the Place de la Bastille.

**Basu'toland**, a native province and British South African possession. The Basutos belong chiefly to the great stem of the Bechuanas, and have made greater advances in civilization than perhaps any other South African race. In 1866 the Basutos, who had lived under a semi-protectorate of the British since 1848, were proclaimed British subjects, their country placed under the government of an agent, and in 1871 it was joined to Cape Colony. In 1879 the attempted enforcement of an act passed for the disarmament of the native tribes caused a revolt under the chief Moirosi, which the Cape forces were unable to put down. When peace was restored, Basutoland was disannexed from Cape Colony (1884), and is now governed by a resident commissioner under the high commissioner of South Africa. Basutoland has an area of about 10,300 sq. mi., much of it covered with grass, and there is but little wood. The climate is pleasant. The natives keep cattle, sheep, and horses, cultivate the ground, and export grain. It is di-vided into four districts, each presided over by a magistrate. Pop. (Europ.) 5,000; (native) 127,707.

**Bat**, one of the group of wing-handed, flying mammals, having the fore-limb peculiarly modified so as to serve for flight, and constituting the order Cheiroptera. Bats are ani-



Bat's heads.

mals of the twilight and darkness, and are common in temperate and warm regions, but are most numerous and largest in the tropics. All European bats are small, and have a mouselike skin. The body of the largest British species is less than that of a mouse, but its wings stretch about 15 in. During the day it remains in caverns, in the crevices of ruins, hollow trees, and such-like lurking-places, and flits out at evening in search of food, which consists of insects. Several species of the same genus are common in North America. Many bats are remarkable for having a singular nasal cutaneous appendage, bearing in some cases a fancied resemblance to a horseshoe. Two of these horseshoe bats occur in Britain. Bats may be conveniently divided into two sections - the insectivorous or carnivorous, comprising all European and most African and American species; and the fruit-eating, belonging to tropical Asia and Australia, with several African forms. An Australian fruit-eating bat, commonly known as the kalong or flying-fox, is the largest of all the bats; it does much mischief in orchards. At least two species of South American bats are known to suck the blood of other mammals, and thence are called



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"vampire-bats" (though this name has also been given to a species not guilty of this habit). As winter approaches, in cold climates bats seek shelter in caverns, vaults, ruined and deserted buildings, and similar retreats, where they cling together in large clusters, hanging head downward by the feet, and remain in a torpid condition until the returning spring recalls them to active exertions. Bats generally bring forth two young, which, while suckling, remain closely attached to the mother's teats, The which are two, situated upon the chest. parent shows a strong degree of attachment for her offspring, and when they are captured, will follow them, and even submit to captivity herself rather than forsake her charge.

**Batan'gas,** a town of the Philippines, in the island Luzon, capital of a province of same name, 58 mi. s. of Manilla. Pop. of town and district, 29,360.

**Bata'via**, a city and seaport of Java. on the north coast of the island, the capital of all the Dutch East Indies. It is situated on a wide, deep bay, the principal warehouses and offices of the Europeans, the Java Bank, the exchange, etc., being in the old town, which is built on a low, marshy plain near the sea, intersected with canals and very unhealthy; while the Europeans reside in a new and much healthier quarter. Batavia has a large trade, sugar being the chief export. It was founded by the Dutch in 1619, and attained its greatest prosperity in the beginning of the eighteenth century. Its inhabitants are chiefly Malay, with a considerable admixture of Chinese and a small number of Europeans. Pop. 93,613.

a small number of Europeans. Pop. 93,613. Batavia, Genesee co., N. Y., on Tonawanda creek, 37 mi. e. of Buffalo. Railroads: N. Y. C. & H. R.; Lehigh Valley; Erie & Tonawanda; Canandaigua & Attica branches of N. Y. C. Industries: harvester co., two flouring-mills, wood-working factory, wheel, gun, shoe, canned goods, paper box, pump and farm implement factories, and planing mill. Surrounding country agricultural. The village was first settled in 1800. Pop. est. 1897, 8,665.

**Bates,** EDWARD (1792-1869), statesman, b. in Virginia. He studied law and was attorneygeneral of Missouri. He served a term in Congress, 1827-28. He received forty-eight votes on the first ballot in the Republican convention of 1860, but withdrew in favor of Abraham Lincoln, who afterward made him attorney-general of the U. S.

**Bath**, a city of England in Somersetshire, on the Avon, which is navigable for barges from Bristol. Bath is remarkable for its medicinal waters, the four principal springs yielding no less than 184,000 gallons of water a day. Pop. 54,551.

**Bath**, the immersion of the body in water, or an apparatus for this purpose. The use of the bath as an institution apart from occasional immersion in rivers or the sea, is, as might be anticipated, an exceedingly old custom. Homer mentions the bath as one of the first refreshments offered to a guest; thus, when Ulysses enters the palace of Circe, a bath is pre-

pared for him, and he is anointed after it with costly perfumes. In later times, rooms both public and private, were built expressly for bathing, the public baths of the Greeks being mostly connected with the gymnasia. The fullest details we have with respect to the bathing of the ancients apply to its luxurious de-velopment under the Romans. Their bathing establishments consisted of four main sections: the undressing room, with an adjoining chamber in which the bathers were anointed; a cold room with provision for a cold bath; a room heated moderately to serve as a preparation for the highest and lowest temperatures; and the sweating-room, at one extremity of which was a vapor-bath and at the other an ordinary hot bath. After going through the entire course both the Greeks and the Romans made use of strigils or scrapers, either of horn or metal, to remove perspiration, oil, and impurities from the skin. Connected with the bath were walks, covered race grounds, tennis courts, and gardens, the whole, both in the external and internal decorations, being frequently on a palatial scale. The group of the Laocoon and the Farnese Hercules were both found in the ruins of Roman baths. With respect to modern baths, that commonly in use in Russia consists of a single hall, built of wood, in the midst of which is a powerful metal oven, covered with heated stones, and surrounded with broad benches, on which the bathers take their places. Cold water is then poured upon the heated stones, and a thick, hot steam rises, which causes the perspiration to issue from the whole body. The bather is then gently whipped with wet birch rods, rubbed with soap, and washed with lukewarm and cold water; of the latter, some pailfuls are poured over his head; or else he leaps, immediately after this sweating-bath, into a river or pond, or rolls in the snow. The Turks, by their religion, are obliged to make repeated ablutions daily, and for this purpose there is, in every city, a public bath connected with a mosque. A favorite bath among them, however, is a modification of the hot-air sudorificbath of the ancients introduced under the name of "Turkish," into other than Moham-medan countries. A regular accompaniment of this bath, when properly given, is the opera-tion known as "kneading" generally performed at the close of the sweating process, after the final rubbing of the bather with soap, and consisting in a systematic pressing and squeezing of the whole body, stretching the limbs, and manipulating all the joints as well as the fleshy and muscular parts. Public baths are common in the U.S. Every large city has a number of baths fitted up in very artistic style, and every house or flat has its bathtub or shower bath. There are also numerous "hot springs' in nearly every section. Among the most fa-mous are those at Hot Springs, Garland co., Arkansas, resorted to by invalids for the cure of rheumatism and similar complaints. There are from seventy-five to one hundred springs, varying in temperature from 105° to 160°, issuing from a lofty ridge of sandstone overlooking

the town, while others rise in the bed of the stream near by. The most celebrated natural hot baths in Europe are those of Aix-la-Chapelle, and the various Baden in Germany; Toeplitz, in Bohemia; Bagnières, Baréges, and Dax, in the south of France; and Spa, in Belgium. Besides the various kinds of water-bath with or without medication or natural mineral ingredients, there are also milk, oil, wine, earth, sand, mud, and electric baths, smoke-baths and gas-baths; but these are as a rule only indulged after specific prescription. The practise of bathing as a method of cure in cases of disease falls under the head of hydropathy.

Bath, Sagadohoc co., Me., on Kennebec River, 39 mi. e. of Portland. Railroad: Maine Central. Industries: iron works, shoe factory, and ship building. Surrounding country agricultural. The town was first settled in 1780 and became a city in 1847. Pop. est. 1897, 9,000.

**Bathom'eter**, an instrument for measuring the depth of sea beneath a vessel without casting a line. It is based upon the fact that the attraction exerted upon any given mass of matter on the ship is less when she is afloat than ashore because of the less density of seawater as compared with that of earth or rock.

**Bathori** (bä'to-rē), a Hungarian family, which gave Transylvania five princes, and Po-land one of its greatest kings. The more im-portant members were: 1, STEPHEN (1532-1586), elected prince of Transylvania in 1571, and in 1575 king of Poland. He recovered the Polish territories in possession of the Czar of Muscovy. 2, SIGISMUND, nephew of Stephen, became prince of Transylvania in 1581, shook off the Ottoman yoke, and resigned his dominions to the Emperor Rudolph II, in return for two principalities and a pension. He returned and placed himself under the protection of the Porte, was defeated by the Imperialists in every battle, and sent to Prague, where he d. in 1613. 3, ELIZABETH, niece of Stephen, and wife of Count Nadasdy, of Hungary. She is said to have bathed in the blood of 300 young girls in the hope of renewing her youth, and to have committed other enormities. She was latterly seized and confined till her death in 1614.

**Bath'urst**, a British settlement on the west coast of Africa, on the island of St. Mary's, near the mouth of the Gambia, with a trade in gum, beeswax, hides, ivory, gold, rice, cotton, and palm oil. Pop. 6,000.

**Bat'leŷ**, a town of England, West Riding of York. Principal manufactures: heavy woolen cloths, such as pilot, beaver, police, army, and frieze cloths, flushings, and blankets. Pop. 28,719.

**Bat'on Rouge** (rözh), E. Baton Rouge parish, the capital of Louisiana, on the left bank of the Mississippi, with an arsenal, barracks, military hospital, state-house, state university, etc. On Aug. 5, 1862, the Confederates under General Breckenridge suffered a defeat before it. Pop. 10,478.

**Batoum** (or Batum) (ba töm'), a port on the e. coast of the Black Sea, acquired by Russia by the Treaty of Berlin. Its importance as a

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naval and military station to Russia is unquestionably great, and it is one of the strongest positions on the Black Sea. The water is of great depth close inshore, and the shipping lies under protection of the overhanging cliffs of the Gouriel Mountains. Pop. 19,890.

**Batrachians** (ba-trā'ki-anz), the fourth order in Cuvier's arrangement of the class Reptilia, comprising frogs, toads, newts, salamanders, and sirens. The term is now often employed as synonymous with amphibia, but is more usually restricted to the order Anura or tailless amphibia.

Bat'tas, a people belonging to the Malayan race inhabiting the valleys and plateaus of the mountains that extend longitudinally through the island of Sumatra. They practise agriculture and cattle-rearing, and are skilful in various handicrafts; they have also a written literature and an alphabet of their own, their books treating of astrology, witchcraft, medicine, war, etc. They are under the rule of hereditary chieftains.

Battering-ram, an engine for battering down the walls of besieged places. The ancients employed two different engines of this kind one suspended in a frame, the other movable on wheels or rollers. They consisted of a beam or spar with a massive metal head, and were set in motion either by a direct application of manual force or by means of cords passing over pulleys. Some are said to have been 120 feet or more in length, and to have been worked



#### Battering-ram.

by 100 men. One is described as being 180 feet long, and having a head weighing 14 tons. They were generally covered with a roof or screen for the protection of the workers. They have been used recently in Irish evictions and evoked much indignation from the Nationalist party.

**Battery**, in criminal law, an assault by beating or wounding another. The least touching or meddling with the person of another against his will may be held to constitute a battery.

Batthyanyi (bàt-yàn'yē), one of the oldest and most celebrated Hungarian families, traceable as far back as the ninth century. Among later bearers of the name have been: COUNT CASIMIR BATTHYANYI, who was associated with Kossuth, was minister of foreign affairs in Hungary during the insurrection of 1849, and d. in Paris 1854; COUNT LOUIS BATTHYANYI, (1809-1849), was leader of the opposition in the Hungarian diet until the breaking out of the commotions of 1848, when he took an active part in promoting the national cause.

Battle Creek, Calhoun co., Mich., on Kalamazoo and Battle Creek Rivers, 160 mi. e. of



Chicago. Railroads: Michigan Central; Grand Trunk; Lake Shore; Cincinnati, Jackson & Mackinaw. Industries: two large threshing machine factories, three flouring mills, three iron foundries, two steam pump factories, and two pure food factories. Surrounding country agricultural. Battle Creek became a city in 1860. Pop. est. 1897, 18,500.

**Baudelaire** (bôd-lär), CHARLES PIERRE (1821-1867), French poet. His first work of importance was a series of translations from Poe, ranking among the most perfect translations in any literature.

**Baudry** (bō-drē), PAUL JACQUES AME (1828-), a prominent French painter. The decoration of the *foyer* of the New Opera House at Paris was intrusted to him — an enormous work, occupying a total surface of 500 sq. meters, but accomplished by him in eight years.

**Bauer** (bou'er), BRUNO (1809-1882), German philosopher, historian, and Biblical critic of the rational school.

**Baumgarten** (boum går-tn), ALEXANDER GOTTLIEB (1714-1762), a German philosopher. He was the founder of æsthetics as a science, and the inventor of this name.

**Baur** (bour), FERDINAND CHRISTIAN (1792-1860), German theologian, founder of the "Tubingen School of Theology."

bingen School of Theology." Bautzen (bout'sen) (or Budissin), German town in the kingdom of Saxony. Chief manufactures: woolens, paper, gunpowder, machines. Napoleon defeated the united armies of the Russians and the Prussians at Bautzen on May 21, 1813. Pop. 21,516.

Bava' ria (German, Baiern; French, Baviere), a kingdom in the south of Germany, the second largest state of the empire. Total area 29,657 sq. mi. The main political divis-ions are: Upper Bavaria, Lower Bavaria, Palatinate, Upper Palatinate, Upper Franconia, Middle Franconia, Lower Franconia, Swabia. After Munich the chief towns are, Nürnberg, Augsburg, Würzburg, and Ratisbon (Regensburg). The principal articles manufactured are, linens, woolens, cottons, leather, paper, glass, earthen and iron ware, jewelry, etc. The optical and mathematical instruments made are excellent. A most important branch of industry is the brewing of beer, for which there are upward of 7,000 establishments, producing over 260 millions of gallons a year. A number of the people maintain themselves by the manufacture of articles in wood, and by felling and hewing timber.

In art Bavaria is best known as the home of the Nürnberg school, founded about the middle of the sixteenth century by Albert Dürer. Hans Holbein is also claimed as a Bavarian; and to these have to be added the eminent sculptors, Kraft and Vischer, both b. about the middle of the fifteenth century. The restoration of the reputation of Bavaria in art was chiefly the work of Ludwig I, under whom the capital became one of the most prominent seats of fine arts in Europe.

The Bavarian crown is hereditary in the male line. The executive is in the hands of the king. The legislature consists of two

chambers: one of senators composed of the princes of the royal family, the great officers of the state, the two archbishops, the heads of certain noble families, and certain members appointed by the crown; the other of deputies, 159 in number, nominated by the electors, who are themselves elected, 1 for every 500 of the population. The lower chamber is elected for six years. Bavaria sends six members to the German Federal Council (Bundesrath) and forty-eight deputies to the Imperial Diet (Reichstag). The army (peace footing, 32,-820; war footing, 112,016) is raised by conscription - every man being liable to serve from January 1 of the year in which he com-pletes his twentieth year. In time of peace it is under the command of the king of Bavaria, but in time of war under that of the emperor of Germany, as commander-in-chief of the whole German army.

History .- The Bavarians take their name from the Boii, a Celtic tribe whose territory was occupied by a confederation of Germanic tribes called after their predecessors Boiarii. These were made tributary first to the Ostrogoths, and then to the Franks, and on the death of Charlemagne, his successors governed the country by lieutenants with the title of margrave, afterward converted (in 921) into that of duke. In 1070 Bavaria passed to the family of the Guelphs, and in 1180 by imperial grant to Otho, count of Wittelsbach. founder of the still reigning dynasty. In 1623 the reigning duke was made one of the elect-ors of the empire. Elector Maximilian II joined in the war of the Spanish succession on the side of France, and this led, after the battle of Blenheim, 1704, to the loss of his dominions for the next ten years. His son, Charles Albert, likewise lost his dominions for a time to Austria, but they were all recov-ered again by Charles's son. Maximilian III (1745). In the wars following the French Revo-lution, Bavaria was in a difficult position between France and Austria, but latterly joined Napoleon, from whom its elector Maximilian IV received the title of king (1805), a title afterward confirmed by the treaties of 1814 and 1815. King Maximilian I was succeeded by his son Ludwig (or Louis) I, under whom various circumstances helped to quicken a desire for political change. Reform being re-fused, tumults arose in 1848, and Ludwig resigned in favor of his son, Maximilian II, under whom certain modifications of the constitution were carried out. At his death in 1864 he was succeeded by Ludwig II. In the war of 1866 Bavaria sided with Austria, and was compelled to cede a small portion of its territory to Prussia, and to pay a war indemnity of \$12,500,000. Soon after Bavaria entered into an alliance with Prussia, and in 1867 joined the Zollverein. In the Franco-German War of 1870-71 the Bavarians took a prominent part, and it was at the request of the king of Bavaria, on behalf of all the other princes and the senates of the free cities of Germany, that the king of Prussia agreed to accept the title of Emperor of Germany.

Since January, 1871, Bavaria has been a part of the German empire, and is represented in the Bundesrath by six, and in the Reichstag by forty-eight members. The eccentricity early displayed by Ludwig II, developed to such an extent that in June, 1886, he was placed under control, and a regency established under Prince Luitpold (Leopold). The change was almost immediately followed by the suicide of the king, and as Prince Otto, the brother and heir of the late king, was insane, the regency was continued. See also Germany.

**Baxter**, RICHARD (1615-1691), the most eminent of the English nonconforming divines of the seventeenth century. The imposition of the doctrine and discipline of the Church of England detached him from the Establishment. He condemned the execution of the king and the election of Cromwell. At the Restoration he became king's chaplain. In 1685 he was arrested and imprisoned. He left about 150 treatises, of which his Saint's Everlasting Rest, and Call to the Unconverted, have been the most popular.

**Bay**, the laurel tree, noble laurel, or sweetbay; but the term is loosely given to many trees and shrubs resembling this. A fatty or fixed oil (used in veterinary medicine) and also a volatile oil is obtained from the berries, but what is called "bayberry oil" is also obtained from the genus candleberry.

**Ba'ya**, the weaver-bird, an interesting East Indian passerine bird, somewhat like the bullfinch. Its nest resembles a bottle, and is suspended from the branch of a tree. The entrance is from beneath, and there are two chambers, one for the male, the other for the female. The baya is easily tamed, and will fetch and carry at command.

**Bayamo** (ba-'jä-mö) (or St. Salvador), a town in the east of Cuba, near the Cauto; pop. 4,560.

Bayard, JAMES ASHETON (1767-1815), statesman, b. in Philadelphia. He was descended from a Huguenot family which settled in Manhattan in the seventeenth century. He graduated at Princeton in 1784, studied law in Philadelphia, was admitted to the bar in 1787, and settled in Wilmington, Del. In 1796 he was elected to Congress as a Federalist. In 1804 he was made U.S. senator. He served from Jan. 15, 1805, till March 3, 1813, and opposed the declaration of war against Great Britain in 1812. President Madison appointed him a commissioner with Albert Gallatin and John Quincy Adams to negotiate a peace with Great Britain. He was appointed U. S. minister to Russia, but declined the office and returned to Wilmington, 1814. His two sons, Richard Henry and James A., were successively senators from Delaware.

**Bayard**, NICHOLAS (1644-1707), b, in Alphen, Holland, d. in New York City; a nephew of Governor Stuyvesant. The old Bayard grounds and mansion in New York City were on the west side of the Bowery, and included the territory now occupied by Lafayette Place, Astor Place, and beyond. In 1664 Nicholas became clerk of the council; was private secretary to Governor Stuyvesant and surveyor of the province. In 1672 he was appointed secretary of the province, and was mayor of New York City and a member of the governor's council in 1685.

Bayard, THOMAS FRANCIS, American statesman, b. at Wilmington, Del., 1828, educated at Flushing, studied law, and in 1868 was elected U. S. senator, where he served till 1884. In 1885 he was made secretary of state in Mr. Cleveland's cabinet. March 30, 1803, was appointed ambassador extraordinary and plenipotentiary to England.

**Bay City**, a city of Michigan, on the east side of Saginaw River, near its mouth in Saginaw Bay, Lake Huron. Chief articles of trade, lumber and salt. Pop. 27,839.

**Bayeux** (bà-you), an ancient town, France, dep. Calvados, 16 mi. n.w. of Caen, with manufactures of lace, calico, and porcelain. In its cathedral, said to be the oldest in Normandy, was preserved for a long time the famous Bayeux tapestry. Pop. 8, 102.

**Bayeux Tapestry**, so called because it was originally found in the cathedral of Bayeux, in the public library of which town it is still preserved. It is supposed to have been worked by Matilda, queen of William the Conqueror. It is 214 ft. in length and 20 in. in breadth, and is divided into seventy-two compartments, the subject of each scene being indicated by a Latin inscription. These scenes give a pictorial history of the invasion and conquest of England by the Normans, beginning with Harold's visit to the Norman court, and ending with his death at Hastings.

**Bay-leaf**, the leaf of the sweet-bay or laurel tree. These leaves are aromatic, and are used in cookery and confectionery.

**Bayley**, JAMES ROOSEVELT (1814-1877), b. in New York City, educated for the Episcopal ministry, and in 1840-41 held a rectorship in Harlem, N. Y. He became a Roman Catholic in 1842, was ordained to the priesthood in 1844. and became first bishop of Newark, N. J., in 1853. In 1872 he was transferred to the archiepiscopal see of Baltimore.

**Bayly** (bā'li), THOMAS HAYNES (1797-1839), English poet, novelist, dramatist and miscellaneous writer. As a song writer he was most prolific and most popular. The Soldier's Teur, We Met—'twas in a Crowd, and a few others, are still well known.

Bay Mahogany, that variety of mahogany exported from Honduras. It is softer and less finely marked than the variety known as Spanish mahogany, but is the largest and most abundant kind.

**Bayonne** (bà-yon), a well-built fortified town, the largest in the French dep. Basses-Pyrénées. Catherine de Medici had an important interview with the Duke of Alba in Bayonne, June, 1565, at which it is said the massacre of St. Bartholomew was arranged. It was also the scene of the abdication of Charles IV of Spain in favor of Napoleon (1808). In 1814 the British forced the passage of the Nive and invested the town, from which the French made a desperate but unsuccessful sortie. Pop. 23,120

17

# Bayonne

**Bayonne**, Hudson co., N. J., on Kill von Kull River, 7 mi. e. of New York City. Railroads: Central R. R. of New Jersey with 5 stations. Industries: oil works, chemical works. The city was incorporated in 1869 and includes what was formerly known as Bergen Point, Centerville, Constable Hook, Bayonne, and Pamrapo, and is populated by people doing business in New York. Pop. est. 1897, 24.500.

**Bayou** (bā-yö'), a name given in the Southern States to a stream which flows from a lake or other stream; frequently used as synonymous with creek or tidal channel.

**Bay Rum**, a spirit obtained by distilling the leaves of *Myrica acris*, or other West Indian trees of the same genus. It is used for toilet

### Beaconsfield

general of division in 1862, and in 1864 was made a marshal of France.

**Bazar'** (or bazaar'), in the East an exchange, market-place, or place where goods are exposed for sale, usually consisting of small shops or stalls in a narrow street or series of streets. These bazar streets are frequently shaded by a light material laid from roof to roof, and sometimes are arched over. Marts for the sale of miscellaneous articles, chiefly fancy goods, are now to be found in most European cities bearing the name of *bazars*. The term bazar is also applied to a sale of miscellaneous articles, mostly of fancy work, and contributed gratuitously in the furtherance of some charitable or other purpose.

Bdellium (del'i-um), an aromatic gum resin



Part of Bayeux Tapestry-Battle of Hastings.

purposes, and as a liniment in rheumatic affections.

**Bay-salt**, a general term for coarse-grained salt, but properly applied to salt obtained by spontaneous or natural evaporation of seawater in large shallow tanks or *bays*.

**Bay-window**, a window forming a recess or bay in a room, projecting outward, and rising from the ground or basement on a plan rectangular, semi-octagonal, or semi-hexagonal, but always straight-sided. The term is, however, also often employed to designate a *bow-window*, which more properly forms the segment of a circle, and an *oriel-window*, which is supported on a kind of bracket, and is usually on the first floor.

**Baza** (bä'thå), an old town of Spain, Andalusia, province of Granada, formerly a large and flourishing city. In 1810 the French, under Marshal Soult, here defeated the Spaniards under Generals Blake and Freire. Pop. 12,895.

**Bazaine** (bá-zān), FRANÇOIS ACHILLE (1811-1888), French general. He served in Algeria, in Spain against the Carlists, in the Crimean War, and joined the Mexican expedition as brought chiefly from Africa and India, in pieces of different sizes and figures, externally of a dark reddish brown, internally clear, and not unlike glue. To the taste it is slightly bitterish and pungent; its odor is agreeable. It is used as a perfume and a medicine, being a weak deobstruent.

Beachy Head, a promontory in the s. of England, on the coast of Sussex, rising 575 feet above sea-level, with a revolving light, visible in clear weather from a distance of 28 mi. A naval battle took place here, June 30, 1690, in which a French fleet under Tourville defeated an English and Dutch combined fleet under Lord Torrington.

**Beaconsfield** (bē'konz-fēld), a village of Buckinghamshire, England, the parish church of which contains the remains of Edmund Burke. It gave the title of earl to the English statesman and novelist, Benjamin Disraeli.

**Beaconsfield**, BENJAMIN DISRAELI, Earl of (1804–1881), an eminent English statesman and novelist, of Jewish extraction; eldest son of Isaac D'Israeli, author of the *Curiosities* of *Literature*. In 1826 he published *Virian Grey*, his first novel; and subsequently traveled in

Italy, Greece, Turkey, and Syria. In 1831 the Young Duke came from his pen. It was followed by Contarini Fleming, Alroy, Henrietta Temple, Venetia, the Revolutionary Epic. In 1835 he unsuccessfully contested Taunton as a Tory. In 1837 he gained an entrance to the House of Commons, being elected for Maidstone. During his first years in Parliament he was a supporter of Peel; but when Peel pledged himself to abolish the corn-laws, Disraeli became the leader of the protectionists. Having acquired the manor of Hughenden in Buckinghamshire, he was in 1847 elected for this county, and he retained his seat till raised to the peerage nearly thirty years later. In 1852, he became chancellor of the exchequer under Lord Derby. In 1858, he again became chancellor of the exchequer, and brought in a reform bill which wrecked the government. In 1866 the Liberals resigned, and Derby and Disraeli came into power, the latter being again chancellor of the exchequer. In 1868 he became premier on the resignation of Lord Derby. In 1874 he again became prime-minister with a strong Conservative majority, and remained in power for six years. This period was marked by his elevation to the peerage in 1876 as earl of Beaconsfield, and by the conclusion of the Treaty of Berlin in 1878. In 1880 he resigned office, though he still re-tained the leadership of his party. Within a few months of his death the publication of a novel called Endymion (his last: Lothair had been published ten years before) showed that his intellect was still vigorous.

**Bead-snake**, a beautiful snake of North America, inhabiting cultivated grounds, especially plantations of the sweet-potato, and burrowing in the ground. It is finely marked with yellow, carmine, and black. Though it possesses poison-fangs, it never seems to use them.

**Beagle** (bē'gl), a small hound, formerly kept to hunt hares, now almost superseded by the harrier, which sometimes is called by its name. The beagle is smaller than the harrier, compactly built, smooth-haired, and with pendulous ears. The smallest of them are little larger than the lap-dog.

**Beam**, a long straight and strong piece of wood, iron, or steel, especially when holding an important place in some structure, and serving for support or consolidation; often equivalent to girder. In a balance it is the part from the ends of which the scales are suspended. In a loom it is a cylindrical piece of wood on which weavers wind the warp before weaving; also the cylinder on which the cloth is rolled as it is woven. In a ship one of the strong transverse pieces stretching across from one side to the other to support the decks and retain the sides at their proper distance : hence a ship is said to be "on her beam ends" when lying over on her side.

**Bean**, a name given to several kinds of leguminous seeds and the plants producing them, probably originally belonging to Asia. The common bean is cultivated both in fields and gardens as food for man and beast. There

are many varieties, as the mazagan, the Windsor, the long-pod, etc., in gardens, and the horse or tick bean in fields. The soil that best suits is a good strong clay. The seed of the Windsor is fully an inch in diameter; the horse-bean is much less, often not much more than half an inch in length and three eighths of an inch in diameter. Beans are very nutritious, containing 36 per cent. of starch and 23 per cent. of nitrogenous matter called legumin, analogous to the caseine in cheese. The bean is an annual, from 2 to 4 feet high. The flowers are beautiful and fragrant. The kidney-bean, French bean, or haricol, is a wellknown culinary vegetable. There are two principal varieties, annual dwarfs and run-The bean cultivated in the U.S. is ners. used largely as an article of food. It is known as the common bean. There are two sorts, the running and the brush, both presenting numerous varieties in size and color. These, cooked with pork, form the well-known "pork and beans." The scarlet-runner bean, a native of Mexico, is cultivated on account of its long rough pods and its scarlet flowers. St. Ignatius bean is not really a bean, but the seed of a large climbing shrub, nearly allied to the species of Strychnos which produces nux vomica. One of the curious products of Mexico is the jumping bean. They grow in pods, each pod containing three beans. They were often exhibited by South American jugglers, who placed them on a table, when they would immediately roll and skip about and make jumps of a couple of inches. This was at one time thought to be the effect of some magical property possessed by the beans, but it was discovered that these vegetables owe their jumping powers to a very simple agent; namely, the larva of a moth, which bores into them and, striking its head against the interior of the bean, causes it to rebound.

**Bean-goose**, a species of wild goose, a migratory bird which arrives in Britain in autumn and retires to the north in the end of April, though some few remain to breed. Being rather less than the common wild goose. it is sometimes called the *small gray goose*.

Bear, the name of several large plantigrade carniverous mammals of the genus Ursus. The teeth are forty-two in number, as in the dog. but there is no carnassial or sectorial tooth, and the molars have a more tubercular character than in other carnivores. The eyes have a nictitating membrane, the nose is prominent and mobile, and the tail very short. The true bears are about ten in number, natives chiefly of North America, Europe, and Asia. They generally lie dormant in their den dur-ing the winter months. The brown or black bear of Europe is the Ursus arctos. It is a native of almost all the northern parts of Europe and Asia, and was at one time common in the British Islands. It feeds on fruits, roots, honey, ants, and in case of need, on mammals. It sometimes reaches the length of seven feet, the largest specimens being found furthest to the north. It lives solitarily. The American black bear is the U. amer

## Bear

icanus, with black shining hair, and rarely above 5 feet in length. It is a great climber, is less dangerous than the brown bear, and is hunted for its fur and flesh. It is very amusing in captivity. The grizzly bear is an inhabitant of the Rocky Mountains; is a ferocious animal, sometimes 9 feet in length, and has a bulky and unwieldy form, but is nevertheless capable of great rapidity of motion, The extinct cave-bear seems to have been closely akin to the grizzly. The Siberian bear is perhaps a variety of the brown bear. The



Polar Bear.

polar or white bear is an animal possessed of great strength and fierceness. It lives in the polar regions, frequents the sea, feeds on fish, seals, etc., and usually is 7 to 8 feet in length. The Malayan or cocoanut palm bear is perhaps the smallest of the bears. It inhabits Cochin-China, Nepaul, the Sunda islands, etc., lives exclusively on vegetable food, and is an expert climber. It is called also sun-bear and bruang. The Indian black bear or sloth-bear of India and Ceylon is reputed to be a flerce and dangerous animal.

**Bear**, Great and Little, the popular name of two constellations in the northern hemisphere. The Great Bear is situated near the pole. It is remarkable for its well-known seven stars, by two of which, called the pointers, the polestar is always readily found. These seven stars are popularly called the *wagon*. Charles's Wain, or the Plow. The Little Bear is the constellation which contains the pole-star. This constellation has seven stars placed together in a manner resembling those in the Great Bear.

**Bearberry**, an evergreen shrub of the heath family growing on the barren moors of Scotland, Northern Europe, Siberia, and North America. The leaves are used in medicine as an astringent and tonic.

Beard, the hair upon the chin, cheeks, and upper lip, which in the human family appears at the age of puberty as a distinctive mark of the male sex. It is usually rather lighter in color than the hair of the head, and as a general rule its character depends upon the nature of the climate. In hot and dry countries.

it is invariably dark, dry, and long; and, on the other hand, thick, curly, and fair in cold and damp countries. The hair, being a bad conductor of heat, protects the face and throat from cold, and acts as a safeguard against ex-cessive heat. The B., particularly the mus-tache, or hair of the upper lip, is of great utility in preventing dust of any kind being inhaled with the breath, particularly so to masons, bakers, glass-engravers, and workers in metals, who in their avocations are constantly exposed to an atmosphere charged with minute particles of the materials operated upon. Slaves in ancient times were deprived of their beards, and with the Turks even now a state of servitude among the attendants of the seraglio is indicated by a shaven face. The intense love of cleanliness on the part of the Egyptians would not suffer them to wear a B., save, according to Herodotus, in times of mourning. Though a shaving people, they had a singular custom of wearing upon the chin a false B. of plaited hair, which differed in shape according to the rank and position of the wearer. Kings wore long and square-bottomed beards, those of private individuals were very short, and gods were distinguished by their long beards curling up at the end.

Among the early Greeks a thick B. was considered a mark of manliness, and the Greek philosphers thought that a certain dignity of character attached to its long growth. Shaving was introduced into Greece by Alexander the Great, who ordered his soldiers to perform that operation, and the practise continued general till the time of Justinian. About 300 B. C., Ticinius Mænas is said to have introduced to the Romans a Sicilian barber who inaugurated shaving, and Pliny states that Scipio Africanus was the first Roman who shaved daily. Later on, the festival which celebrated the assumption of the toga virilis by a young Roman was made the occasion of the first operation of shaving, and the hair then cut off was consecrated to some deity. The Bayeux tapestry shows that mustaches were worn by the English soldiers prior to the inva-sion of the Normans, who shaved not only the entire face, but the back of the head likewise. This Norman custom caused Harold's spies to report that the invaders were all priests. Louis XIII, of France, not being endowed by nature with a B., his courtiers revived the fashion of shaving, and soon after, partial shaving, and trimming the mustaches and B. to an ornamental form, became general over Europe. In the sixteenth century the English clergy were noted for their beards of great length. In the beginning of the eighteenth century, the face was wholly shaven, and continued so till early in the present century, when the French led the van in again wearing the B. During the reign of Czar Peter the Great, a tax was imposed upon beards, and collected at the gates of every town.

Beard, GEORGE MILLER (1839-1883), b. at Montville, Conn., graduated at Yale in 1862,

and took his degree of M. D. in 1866. Doctor Beard was a specialist on diseases of the nervous system, and wrote extensively on the medical use of electricity and other branches of medical science.

**Beard**, WILLIAM HOLBROOK, painter, b. in Painesville, O. 1825. He began as a portrait painter about 1841, and settled in Buffalo in 1850, remaining until 1857. He went to Europe and studied in Switzerland, Italy, and France. In 1860 he established himself in New York City, and became a member of the Academy in 1802. He has devoted himself almost exclusively to the painting of animals.

**Beardstown**, Cass co., Ill., on Illinois River, 45 mi. w. of Springfield. Railroads: B. & O. S. W., and C. B. & Q. It has 6 churches, 1 high school, and 2 ward schools. Industries: 2 banks, 2 flouring mills, 1 brewery, 1 saw mill, electric light plant and a number of factories. Natural gas now used for fuel to run the engines of the mills and electric light plant. The town was founded by Thomas Beard in 1829, incorporated as a town in 1837, and became a city in 1849. Pop. est. 1897, 5,000.

Bearing, the direction or point of the compass in which an object is seen, or the situation of one object in regard to another, with reference to the points of the compass. Thus, if from a certain situation an object is seen in the direction of n.e., the *bearing* of the object is said to be n.e. from the situation. To take bearings, to acertain on what point of the compass objects lie.

pass objects lie. Bear Lake, Great, an extensive sheet of fresh water in the n.w. territory of Canada. Area about 14,000 sq. mi. The water is very clear and the lake abounds in fish.

**Béarn** (b&-årn), one of the provinces into which France was formerly divided, now chiefly included in the department of Lower Pyrenees. Pau is the chief town. There is a peculiar and well-marked dialect—the Béarnease—spoken in this district, which has much more affinity with the Spanish than with the French.

**Beatrice,** Gage co., Neb., on Big Blue River, 90 mi. s.w. of Omaha. Surrounding country agricultural. Railroads: U. P., R. I., B. & M. P. Principal manufactures: flour, lumber, and cement. Water power furnished by the river. There are also numerous quarries of magnesia, and limestone, which is used as building material. Pop. est. 1897, 14.230.

**Beatrice Portinari** (1266-1290) (bā-á-trō' chāpor-tō-nā' rē), the poetical idol of Dante; the daughter of a wealthy citizen of Florence, and wife of Simone de Bardi. She was but eight years of age, and Dante nine, when he met her first at the house of her father. He altogether saw her only once or twice, and she probably knew little of him. The story of his love is recounted in the Vita Nuova, which was mostly written after her death.

Beau'tort, the name of sixteen different towns and castles in France, of which the most important is B.-EN-VALLE'E, a town in the department of Maine-et-Loire (Anjou), 15 mi. e. of Angers, with manufactures of sailcloth. leather, etc., and a trade in grain, hemp, nuts, prunes, and wine. Pop. 4,492. B. had formerly a strong castle, and gave title to the English Dukes of B.

Beauharnais (bö-àr-nā), ALEXANDRE, Viscount (1760-1794). He married Joséphine Tascher de la Pagerie, who was afterward the wife of Napoleon. He served under Rochambeau in the Revolutionary War. In 1792 he was general of the army of the Rhine. He was falsely accused of having promoted the surrender of Mainz, and was guillotined.

Beauharnais, EUGENE DE (1781-1824), Duke of Leuchtenberg, Prince of Eichstädt, and Viceroy of Italy during the reign of Napoleon. He accompanied Napoleon to Egypt in 1798; rose rapidly in the army; was appointed viceroy of Italy in 1805. To him and to Ney, France was mainly indebted for the preservation of the remains of her army during the retreat After the fall of Napoleon from Moscow. he delivered Lombardy and all Upper Italy to the Austrians. He then went to Paris, and thence to his father-in-law at Munich, where he afterward resided. His sister HOR-TENSE EUGENIE (1783-1837). She became Queen of Holland by marrying Louis Bona parte. Napoleon III. was her third and youngest son.

Beaumarchais (bō-mär-shā), PIERRE AUGUS-TIN CARON DE (1732-1799), a French wit and dramatist. He occupied himself with literature, and published two dramas. He first distinguished himself by his Mémoires, or statements in connection with a lawsuit, which by their wit, satire, and liveliness entertained all France. The Barber of Seville and the Marriage of Figaro have given him a permanent reputation. He was a singular instance of versatility of talent, being at once an artist, politician, projector, merchant, and dramatist.

**Beaumont** (bo'mont), FRANCIS, and **Fletcher**, JOHN, two eminent English dramatic writers, contemporaries of Shakespeare, and the most famous of literary partners.

Beaumont, WILLIAM, M. D., an American surgeon, b. 1785, d. 1853. His experiments on digestion with the Canadian, St. Martin, who lived for years after receiving a gunshot wound in the stomach which left an aperture of about two inches in diameter, were of great importance to physiological science.

**Beaune** (bon), a town in France, dep. Côte d'Or, 23 mi. s.s.w. Dijon, well built, with handsome church, public library, museum. etc., and a trade in the fine Burgundy and other wines of the district. Pop. 12,470.

**Beaune** (bon), FLORIMOND, a distinguished mathematician and friend of Descartes, b. at Blois 1601, d. at the same place 1652. He may be regarded as the founder of the integral calculus.

**Beauregard** (bō-rė-gàrd), PETER GUSTAVE TOUTANT DE (1818-), American soldier. He studied at the military academy, West Point, and left it as artillery lieutenant in 1838. He served in the Mexican War, and on the outbreak of the Civil War joined the Confederates.



Beauvais

He commanded at the bombardment of Fort Sumter, gained the battle of Bull Run, lost that of Shiloh, assisted in the defense of Charleston, and aided Lee in that of Richmond.

**Beauvais** (bō-vā) (ancient Bellovacum), a town in France, capital of the department of Oise, with some fine edifices, the choir of the uncompleted cathedral being one of the finest specimens of Gothic architecture in France. In 1472 Beauvais resisted an army of 80,000 Burgundians under Charles the Bold. On this occasion the women particularly distinguished themselves, and one of them, Jeanne Lainé, called La Hachette, seeing a soldier planting a standard on the wall, seized it and hurled him to the ground. The banner is preserved in the townhall, and an annual procession of young girls commemorates the deed. Manufactures: tapestry and carpets, trimmings, woolen cloth, cottons, etc. Pop. 19,382.

**Beaver**, a rodent quadruped, about two feet in length exclusive of the tail, at one time common in the northern regions of both hemispheres, but now found in considerable numbers only in the U. S. and Canada, living in colonies, but occurring solitary in Central Eu-



Beavers and Village.

rope and Asia. It has short ears, a blunt nose, small fore-feet, large webbed hind-feet, with a flat ovate tail covered with scales on its upper surface. It is valued for its fur, which used to be largely employed in the manufacture of hats, but for which silk is now for the most part substituted, and for an odoriferous secretion named castor, at one time in high repute, and still largely used in some parts of the world as an anti-spasmodic medicine. The food of the beaver consists of the bark of trees, leaves, roots, and berries. Their favorite haunts are rivers and lakes which are bordered by forests. In winter they live in houses, which are 3 to 4 feet high, are built on the water's edge, and being substantial structures with the entrance under water afford them protection from wolves and other wild animals. These dwellings are called beaver ''lodges,''

and accommodate a single family. They also live in burrows. They can gnaw through large trees with their strong teeth, this being done partly to obtain food, partly to get materials for houses or dam-building. When they find a stream not sufficiently deep for their purpose they throw across it a dam constructed with great ingenuity of wood, stones, and mud.

**Beaver Falls**, Beaver co., Pa., near the junction of the Beaver River with the Ohio, 34 mi. from Pittsburgh. Various factories are here. Pop. 10,100.

**Beaver**, JAMES A., b. in Perry co., Pa., 1837, practiced law, and, in 1861, joined the volunteer army as a lieutenant and was made a colonel. He was wounded at Chancellorsville and lost a leg at Petersburg. He was elected governor of Pennsylvania on the Republican ticket in 1882 and in 1886.

**Becerra** (be-ther'a), GASPAR (1520-1570), a Spanish painter and sculptor. He studied under Michel Angelo at Rome, and is credited with the chief share in the establishment of the fine arts in Spain.

Bechuanas (Betchuanas) (bech-wan'az). a race inhabiting the central region of South Africa north of Cape Colony. They belong to the great Kaffre stem, and are divided into tribal sections. They live chiefly by husbandry and cattle rearing, and they work with some skill in iron, copper, ivory, and skins. They have been much harassed by Boers and others, and this led them to seek British protection. From 1878 to 1880 South Bechuanaland was partly administered by British officers; and in 1884 and 1885 great part of the rest of their territory was brought under British influence. the farthest northern portion of it, however, reaching to the Zambezi, being only a protec-torate. The area is 180,000 sq. mi., and pop. 478,000. Chief towns: Vryburg, Mafeking, and Jaungs. Gold, coal, and copper have been found.

**Beck' ford,** WILLIAM (1759-1844), an English writer famous in his time for his immense wealth and his eccentricities. In 1770 the death of his father left him in the possession of \$5,000,000 of money, and an income of \$500,000 a year. His literary fame rests upon his eastern tale *Vathek*, which he wrote in French in three days and two nights.

**Bookmann**, JOHANN (1739–1811), German writer on the industrial arts and agriculture. He was professor of physics and natural history at St. Petersburg. and afterward for almost forty-five years professor of philosophy and economy in Göttingen. His *History of Intentions* is well known in the English translation of it.

Becquerel (bek-rel), ANTOINE CESAR (1788– 1878), French physicist. He served as an officer of engineers, and retired in 1815, after which he devoted himself to the study of electricity, especially electro-chemistry. He refuted the "theory of contact" by which Volta explained the action of his pile or battery. Becquerel may be considered one of the creators of electro-chemistry.

Bed (or stratum), is a layer of rock of simi-

lar materials, and of some thickness, cohering more or less firmly together, as a rule. course, in the case of soft unconsolidated strata, the materials of a bed may not be coherent. Beds are often composed of many fine laminæ or plates. The laminæ are the results of intermissions in the supply of materials, produced by such causes as the ebb and flow of the tide, river-floods, or the more or less turbid state of the water under which they were deposited. When the intervals between the supply of materials were short, the numerous laminæ closely adhere, and form a bed cut off from the superior deposit by the occurrence of a longer interval, during which the bed became consolidated more or less before the next was deposited. When the lamination is obscure, or not distinct from the stratification, it would seem to indicate that the materials had been supplied without any intermission.

Bede (Beda, or Bæda) (672-735), known as the Venerable Anglo-Saxon Scholar, educated at St. Peter's monastery, Wearmouth; took deacon's orders in his nineteenth year at St. Paul's monastery, Jarrow, and was ordained priest at thirty. He was the most learned Englishman of his day, and in some sense the father of English history, his most important work being his *Ecclesiastical History of England*.

**Bedeguar** (or Bedegar) (*bed'e-gär*), a spongy excressence or gall, sometimes termed sweetbrier sponge, found on various species of roses, and produced by several insects as receptacles for their eggs. Once thought a diuretic and vermifuge.

Bed'ford, England, county town of Bedford-shire, on the Ouse. The chief buildings are the law courts, a range of public schools, a large infirmary, county jail, etc., and the churches. There is an extensive manufactory of agricultural implements; lace is also made, and there is a good trade. John Bunyan was born at Elstow, a village near the town, and it was at Bedford that he lived, preached, and was imprisoned. A fine monument has been erected to him in the town. Pop. 28,023. Bedfordshire (or Beds) the county, is bounded by Northampton, Bucks, Herts, Cambridge, and Huntingdon. Area 463 sq. mi. Two thirds of the soil is under tillage. Besides the usual cereal and other crops, culinary vegetables are extensively cultivated for the London market. Principal manufactures: agricultural implements, and straw-plait for hats, which is made up principally at Dunstable and Luton. Pop. 160.729.

Bedford, JOHN, Duke of, one of the younger sons of Henry IV, king of England. He defeated the French fleet in 1416, commanded an expedition to Scotland in 1417, and was lieutenant of England during the absence of Henry V in France. He became regent of France, and for several years his policy was as successful as it was able and vigorous. The greatest stain on his memory is his execution of the Maid of Orleans (Joan of Arc) in 1431. He died in 1435 at Rouen, and was buried in the cathedral of that city.

Bedlam, a corruption of Bethlehem (hospital), the name of a religious house in London, converted into a hospital for lunatics. The original Bedlam stood in Bishopsgate street, its modern successor is in St. George's Fields. The lunatics were at one time treated as little better than wild beasts, and hence Bedlam came to be typical of any scene of wild confusion. The average number of patients is about 300.

Bedouins (bed-u-enz'), a Mohammedan peo-ple of Arab race inhabiting chiefly the deserts of Arabia, Syria, Egypt, and North Africa. They lead a nomadic existence in tents, huts, caverns, and ruins, associating in families under sheiks, or in tribes under emirs. In respect of occupation they are only shepherds, herdsmen, and horse-breeders, varying the monotony of pastoral life by raiding on each other, and plundering unprotected travelers whom they consider trespassers. They are ignorant of writing and books, their knowledge being purely traditional and mainly genealogical. In stature they are undersized, and, though active, they are not strong. The ordinary dress of the men is a long shirt girt at the loins, a black or red and yellow handkerchief for the head, and sandals; of the women, loose drawers, a long shirt, and a large dark-blue shawl covering the head and figure. The lance is the favorite weapon.

Bee, the common name given to a large family of hymenopterous or membranous-winged insects, of which the most important is the



Black and Yellow Bee.

common hive or honey bee. It belongs to the warmer parts of the eastern hemisphere, but is now naturalized in the western. A hive commonly consists of one mother or queen, from 600 to 800 males or drones, and from 15,000 to 20,000 working bees, formerly termed neuters, but now known to be imperfectly developed females. The last mentioned, the smallest, have twelve joints to their antennæ, and six



abdominal rings, and are provided with a sting; there is, on the outside of the hind legs, a smooth hollow, edged with hairs, called the basket, in which the kneaded pollen or beebread, the food of the larvæ, is stored for transit. The queen has the same characteristics, but is of larger size, especially in the abdomen; she has also a sting. The males, or drones, differ from both the preceding by having thirteen joints to the antennæ: a rounded head, with larger eyes, elongated and united at the summit; and no stings. According to Huber the working-bees are themselves divisible into two classes: one, the *cirieres*, devoted to the collec-tion of provisions, etc.; the other, smaller and more delicate, employed exclusively within the hive in rearing the young. The mouth of the bee is adapted for both masticatory and suctorial purposes, the honey being conveyed thence to the anterior stomach or crop, communicating with a second stomach in which alone a digestive process can be traced. The queen, whose sole office is to propagate the species, has two large ovaries, consisting of a great number of small cavities, each containing six-teen or seventeen eggs. The inferior halfteen or seventeen eggs. circles, except the first and last, on the abdomen of working-bees, have each on their inner surface two cavities, where the wax, secreted by the bee from its saccharine food, is formed in layers, and comes out from between the abdominal rings. Respiration takes place by means of air-tubes which branch out to all parts of the body, the bee being exceedingly sensitive to an impure atmosphere. Of the organs of sense the most important are the antennæ, deprivation of these resulting in a species of derangement. The majority of entomologists regard their function as in the first place auditory, but they are exceedingly sensitive to tactual impressions, and are apparently the principal means of mutual communication. Bees undergo perfect metamorphosis, the young appearing first as larvæ, then changing to pupe, from which the imagos or perfect in-sects spring. Whether the offspring are to be female or male is said to be dependent upon the contact or absence of contact of the egg with the impregnating fluid received from the male and stored in a special sac communicating with the oviduct, unfertilized eggs producing males. The further question whether the offspring shall be queens or workers is resolved by the influence of environment upon function. The enlargement of a cell to the size of a royal chamber and the nourishment of its inmate with a special kind of food appear to be sufficient to transform an ordinary working-bee larvæ into a fully-developed female or queen bee. The season of fecundation occurs about the beginning of summer, and the laying begins immediately afterward, and continues until autumn; in the spring as many as 12,000 eggs may be laid in twenty-four days. Those laid at the commencement of fine weather all belong to the working sort, and hatch at the end of four days. The larvæ acquire their perfect state in about twelve days, and the cells are then immediately fitted up for the reception of new

eggs. The eggs for producing males are laid two months later, and those for the females immediately afterward. This succession of generations forms many distinct communities, which, when increased beyond a certain degree, leave the parent hive to found a new colony elsewhere. Thus three or four swarms sometimes leave a hive in a season. A good swarm is said to weigh at least 6 or 8 pounds. The humblebees, or bumblebees, of which

about forty species are found in Britain and over sixty in North America, belong to the genus Bombus, which is almost worldwide in its distribution. Of these species solitary females which have survived the winter commence constructing small nests when the weather begins to be warm enough; some of them going deep into the earth in dry banks, others preferring heaps of stone or gravel, and others choosing always some bed of dry moss. In the nest the bee collects a mass of pollen, and in this lays some eggs. The cells in these nests are not the work of the old bee, but are formed by the young insects similarly to the cocoons of silkworms; and when the perfect insect is released from them by the old bee, which gnaws off their tops, they are employed as honey-cups. The humblebees, however, do not store honey for the winter, those which survive till the cold weather leaving the nest and penetrating the earth, or taking up some other sheltered position, and remaining there till the spring. The first brood consists of workers, and successive broods are produced during the summer. The experiment of domesticating different kinds of wild bees has been tried with no satisfactory results. Some bees, from their manner of nesting, are known as "mason bees," "carpenter bees," and "up-holsterer bees." Some of these bees cement particles of sand or gravel together with a wiscid substance in forming their nests; others make burrows in wood. The leaf-cutter or upholsterer bee lines its burrow with bits of leaf cut out in regular shapes.

**Beech**, the common name of trees well known in various parts of the world, including



Branch of Common Beech. a.-flower; b.-fruit. America, New Zealand, and Terra del Fuego. The wood is hard and brittle, and if exposed

to the air liable soon to decay. It is, however, peculiarly useful to cabinetmakers and turners; carpenters' planes, furniture, sabots, etc., being made of it; and it is durable under water for piles and mill-sluices. The fruit or beech mast, when dried and powdered, may be made into a wholesome bread; it has also occasionally been roasted and used as a substitute for coffee, and yields a sweet and palatable oil used by the lower classes of Silesia instead of butter. Beech mast is, however, chiefly used as food for swine, poultry, and other animals. The leaves of the beech tree collected in the autumn, before they have been injured by the frosts, are in some places used to stuff mattresses. The North American white beech is identical with the European species.

identical with the European species. Beecher, HENRY WARD (1813-1887), American preacher, third son of Lyman Beecher, b. Litchfield, Conn. As a child he was diffident and sensitive, loved the ocean and was only prevented from going to sea by his conversion (1826). When but eleven years old he defeated an opponent in a debate on Paine's Age of Reason. He showed marked talent as a debater in college. He studied theology under his father's instruction in Lane Semi-nary. He was pastor of a Presbyterian church in Lawrenceburg, Ind. (1837-39), and at the same time was connected with an anti-slavery paper in Cincinnati. From 1839-47 he preached in Indianapolis, contributing articles on fruits, flowers, and farming to an agricultural paper. In 1847 he took charge of Plymouth church, Brooklyn. His congregation, noted for generosity and intelligence, heartily sympathized with him in his efforts for reform, especially in his advocacy of abolition and temper-ance. His opinion on all public questions was eagerly sought. He was original in treatment and choice of subjects for his sermons, and his delivery was eloquent, dramatic, pathetic, and witty. In power of physical endurance he was a marvel. Tender-hearted and charitable himself, any form of injustice called from him bitter denunciations. As an after-dinner speaker he was without a peer, and his popularity as a lecturer knew no abatement. One famous oration of his was on Robert Burns, delivered January, 1859. Another, delivered April, 1865, was his Fort Sumter oration. He was a Republican and aided the cause for which it stood by pen and speech. He took part in the canvass of 1856. Through his influence and addresses, opinion in England concerning the Civil War was materially modified. His trial for adultery (1875) ended by a division of the jury, nine for acquittal and three against. His last public address was in Chickering hall, New York, Feb. 25, 1887, in favor of high license. After he came to Brooklyn he contributed his Star Papers to the Independent, of which he became editor 1861. He edited the Christain Union (1870-81) and was a frequent contributor to the Ledger. In Plymouth Pulpit are preserved the sermons preached from 1859 till his death. Among his many published works is a novel entitled Norwood. He married, 1837, Eunice White Bullard, author of From Dawn to Daylight. She d. March 8, 1897. H. W. Beecher's three brothers, Charles, Edward, and Thomas, have all distinguished themselves as Congregational clergymen. His sister Catherine Esther (1800-1878) did much for the education of women, and wrote on this subject and on domestic economy and kindred subjects. Beecher, LYMAN (1775-1863), clergyman, b.

in New Haven, Conn., graduated at Yale in 1797, and studied theology. In 1798 he was licensed to preach, accepted the pastorate of the Presbyterian church in East Hampton, L. I. A sermon on dueling, suggested by the duel between Alexander Hamilton and Aaron Burr, in 1806, made a great impression, and he soon became one of the best known preachers of New England. He was pastor of the Con-gregational church in Litchfield, Conn. (1810-26), and pastor of the Hanover Street church, Boston (1826-1832). He upheld the Puritan doctrine. From 1832 till 1851 Mr. Beecher was president of the Lane Theological Seminary, Cincinnati, in which he was professor of theology, and in 1832-42 was pastor of the Second Presbyterian church of Cincinnati. In 1835 Mr. Beecher was arraigned and tried for heresy by the Calvinists. He was acquitted by the general assembly, and on the division of the Presbyterian church into two factions. he joined the new school. He returned to Boston, 1851, and spent his time in publishing and revising his works. During his last 10 years he lived in Brooklyn. He was married 3 times, and his five sons, William Henry. Edward George, Henry Ward, Charles, and Thomas Kinnicut became clergymen.

Bee-eaters, a family of Fissirostral Passerine birds, distributed over Africa, India, the Moluccas, and Australia, chiefly known in Europe as common bee-eater, a summer visitant to Russia and the Mediterranean borders. For the most part they nest in colonies, depositing their eggs like the sand-martins, at the end of a tunnel sometimes 8 or 9 ft. long. They are frequently killed for their plumage, which is brownish-red and yellow above, paleblue on the forehead, yellow at the breast, and green at the wings.

Beef-eaters, yeomen of the guard of the sovereign of Great Britain, stationed by the sideboard at great royal dinners, and dressed after the fashion of the time of Henry VII. Also a name for certain African insessorial birds which feed on the larvæ embedded in the hides of buffaloes or other large animals.

Beef, extract of. The beef is cut from the cattle for the most part from the forequarters. No shanks or gluey parts of the animal, but only the lean pieces are used. These are thoroughly washed and loaded into trucks and hauled away to the cooking department, consisting of a long room in which are two rows of round copper boilers. These consist of an upper and a lower hemisphere so built that they can be fastened together hermetically. The lower hemisphere is built double, the intervening space being filled with hot water. From the upper hemisphere there extends a pipe which is connected with a vacuum pump.
There is also a large eye of glass in the upper hemisphere. About 2,000 pounds of flesh are placed in a kettle with a little water, the air is pumped out, and the hot water is turned into the jacket. The meat is cooked for six or eight hours. The liquor which surrounds it is thick and pasty. The process of cooking is watched by experienced workmen through the glass windows. The liquor is now drained off and clarified, after which it is pumped through two or three filter presses which catch any impurities and retain all the fibers still left in the mass of extract. It is then poured into a vacuum pan, 7 ft. long, 12 ft. high, and 6 ft. broad, the bottom part of which is filled with steam coils, and from the top a pipe runs to the exhaust pump. Enough extract liquor is allowed to flow into the pans to cover the pipes and the free water is quickly evaporated. The extract then passes to a second vacuum pan, where it is condensed to a thick brown paste. It is then sent to a mill where it is rendered thoroughly homogeneous. It is then placed in small jars and is ready for market. Each pound of the extract contains all of the nutritive matter in 45 pounds of meat.

Beef, preparation of. In the large packing houses the preparation of beef is an interest-ing process. The steers are caught in long narrow pens, divided by doors into compartments large enough for two animals. The butcher passes along on a little platform just back of the pens and above them, with a large iron sledge-hammer. The object is to hit the animal just hard enough to stun it, for if it is killed outright the blood does not run so freely after the throat is cut. The animals are then slid into the slaughtering room and a workman hitches a rope to the animal's leg and raises it into the air by means of pulleys until it can be hitched to a traveling pulley running on ceil-ing rails. Another man cuts the animal's throat and the blood splashes down and is carried off by means of troughs in the floor to vats below, where it is taken away to the fertilizer factory (see Blood). The animal is now trundled along until it reaches the "header" who, with very few movements splits the skin of the head, draws it loose and severs the head from the body. The head is thrown down a chute to a room below, where one man removes the tongue, another cuts off the cheek meat, and another sends the remaining bones to the fertilizer factory. In the meantime the animal is switched off on a side-track leading toward the butchering beds. A butchering bed consists of two large iron plates set into the floor about two feet apart and full of small round holes. Four men, called the "foot-skinners," begin the work and lay back the hide from the legs of the first animal and then pass quickly to the next. The "leg-breakers" succeed them and cut off the legs at the first joint and throw them to one side. The "ripper-open," as he is called, comes next and performs his part of the work. Then the "caulpuller" removes the caul-fat, after which the "floorsmen" begin the skinning of the carcass. This process requires great skill and care, as

only the fell between the hide and the flesh must be cut. When the hide has been skinned down to the back the animal is again suspended in the air. The fell is beaten down by a man with a cleaver, and as soon as it is loosened it is spread out on the floor. The entrails are removed and sent down through a chute and the "backbone-splitter" cuts the carcass down at exactly the center of the backbone. When the two halves swing apart they are pushed along the ceiling rail into the cooling-room, where they are kept for a week or two to cure. The whole process from the time the animal leaves the killing stalls until the halves of beef hang in the cooling-room is about eight minutes. During the work of slaughtering there are several inspectors present who watch every animal. These are the government inspector, the state inspector, a representative from the city health department, and the private inspector of the com-The caul-fats are now utilized in the manufac-ture of oleomargarine oil. The common fats are rendered into tallow. The tongue, liver, and heart are sold or made into sausage. The intestines are cleaned and utilized in covering sausages of several kinds. From the stomach comes plain or honeycomb tripe and pepsin, and the gall is used by printers, painters, and dyers. The horns, shins, and bladebones are used for knife-handles, combs, bone buttons; and the knuckles, feet, sinews, bones from the extract department, hoofs, hide trimmings, and calves' feet are utilized in the glue department and for fertilizers.

Bee-hawk, a name given to the honey-buzzard which preys on hymenopterous insects.

**Beelzebub** (bē-el'zē-bub) (Hebrew "the god of flies"), the supreme god of the Syro-Phœnician peoples, in whose honor the Philistines had a temple at Ekron. The origin of this worship is probably to be sought in the scourge of flies to which the hot plain of Philistia has always been subject.

Beer. See Brewing.

Beershe ba, "the well of the oath," the place where Abraham made a covenant with Abimelech, and in common speech representative of the southernmost limit of Palestine, near which it is situated. It is now a mere heap of ruins near two large and five smaller wells, though it was a place of some importance down to the period of the Crusades.

Bees' wax, a solid fatty substance secreted by bees, and containing in its purified state three chemical principles-myricin, cerin, and ceroelin. It is not collected from plants, but elaborated from saccharine food in the body of the bee. It is used for the manufacture of candles, for modeling, and in many minor processes. Before beeswax is put on the market it must be whitened or bleached. The beeswax is sent to the bleaching house in the shape of loaf-shaped cakes, each weighing about 25 pounds. The cakes are broken into small pieces and put into a cedar vat about 5 ft. high and 3 ft. across. In the bottom of this vat are two square wooden pipes in the

tops of which are holes which are connected with a steam pipe. This steam pipe conveys the steam to the wooden pipes at a pressure of about 60 pounds to the sq. in. Between 1,200 and 1,800 pounds of wax is placed into the vat and enough water is run in to float it. The steam is then turned on and it jets up through the holes in the wooden pipes, melting the wax. The dirt in the wax falls to the bottom of the vat, and in about three hours after the steam is on, the wax is ready to be drawn off. The wax after passing through a sieve falls into a wooden roller about 5 ft. long and a foot and one-half in diameter which re-volves in cool water. The wax clings to the roller and is carried around into the water. The roller turns once every second, and when the chilled beeswax is carried around into the cooler water it flies off the roller into the water bed. It is then lifted out by means of wooden forks, placed in boxes, and carried outside to the bleaching bed. These beds stand about 3 ft. above the ground and are about 100 ft. long, 15 ft. wide, and 1 ft. deep. The wax is spread out on these beds and allowed to remain for about 5 weeks exposed to the full light of the sun. The wax is sprinkled with water several times a day to prevent it from melting under the sun's rays, and each day it is harrowed with a rake so that all parts will be exposed to the sun several times. The wax is then a creamy white. It is taken back to the melting vats, remelted, run through a screen over a wooden roller, and brought back to the bleaching bed for another stay of about two weeks. By this time the wax is a pure white and is ready to be put into marketable shape. The wax is again melted and placed into pans and allowed to remain about an hour, when it is ready for the market.

Beet, a genus of plants, nat. order Chenopodiaceæ, distinguished by its fruit being enclosed in a tough woody or spongy five-lobed enlarged calyx. Two species only are known in general cultivation: namely, the sea beet and the garden beet. The former is a tough-



rooted perennial, common on many parts of the British coast and sometimes cultivated for its leaves, which are an excellent substitute for spinach. Of the garden beet, which differs from the last in being of only biennial duration and in forming a tender fleshy root, two principal forms are known to cultivators, the chard beet and the common beet. In the chard beet the roots are small, white, and rather tough, and the leaves are

Common Beet. furnished with a broad, fleshy midrib (*chard*), employed as a vegetable by the French, who dress the ribs like sea kale under the name of *poirée*. Some writers regard this as a peculiar species. The common beet includes all the fleshy-rooted varieties, such as red beet (with a fleshy large carrot shaped root), yellow beet, sugar beet, mangel-wurzel, etc. For garden purposes the best is the red beet of Castelnaudary, so called from a town in the s. w. of France. The beet requires a rich light soil, and being a native of the Mediterranean region is impatient of severe cold, requiring to be taken up in the beginning of winter and packed in dry sand, or in pits like potatoes, the succulent leaves having been first removed. Red beet is principally used at table, but if eaten in great quan-tity is said to be injurious. The beet may be taken out of the ground for use about the end of August, but it does not attain its full size and perfection till the month of October. A good beer may be brewed from the beet, and it yields a spirit of good quality. From the white beet the French, during the wars with Napoleon I, succeeded in preparing sugar, that article, as British colonial produce, having been prohibited in France. Since that time, with the increase of chemical and technical knowledge, the making of beet-sugar has become an important industry in the U.S., France, Germany, Austria, Russia, Belgium, and Holland.

The process of making sugar from beets in the U.S. is substantially as follows : Beets are brought into the factory, dumped into long V-shaped trenches 10 to 20 ft. wide and 6 to 10 ft. deep. At the bottom of each of these is another ditch reaching downward with perpendicular sides 20 to 30 in. deep and having a curved bottom 18 in. wide. The sides and bottom are coated with cement, making a sort of flume through which water will flow. All the ditches slope toward the factory and meet near it in one large ditch. Before the beets are thrown into the larger and upper trench the smaller one is covered with boards to prevent the beets from falling into it, thus the beets are kept until needed. The object is to keep the beets without losing the sugar or blackening the juice. The beets when brought in have had the leaves cut off and most of the soil knocked off. When they are wanted in the factory a stream of water from an overhead flume is let into the upper end of the bottom ditch. The loose boards covering it are raised and the beets are allowed to fall into the swiftly running stream below and are floated along to the house. At the end of the ditch the beets are caught by buckets arranged along the rim of a large revolving wheel, lifted out of the water and discharged into a washing machine. From the washing machine they are discharged into an elevator which carries them to the very top of the building. Here they are discharged into an automatic weighing machine which weighs off half a ton at a time, registers, and drops the beets into the slicer. The slicer is a large wheel lying flatwise and carrying upon its flat surface corrugated knives, which in revolving under the beets cuts them into long, thin, diamond-shaped slices about ‡ in. wide and a in. thick. Just below the slicer upon the

second floor of the factory is a circle of 12 to 14 wrought-iron tanks each capable of holding about one and one-half tons of slices. A revolving chute from the slicer fills each one in succession. Large pipes connect these to-gether. The first is filled with slices, and water is let in from a tank above, which is allowed to stand while the second tank is fill-Then the valves are opened into the ing. next tank containing fresh slices, and fresh water, running into the first tank under pressure, forces the water already containing some sugar on into the next tank, where it becomes richer, and so on from tank to tank, always tending to bring the sugar which is outside the little beet cells and that which is inside to a balance. As the water progresses it is raised in temperature by steam coils. After the water has gone through about ten tanks it contains about as much sugar as the beets, and is drawn off into a measuring tank. The slices in the first tank, which have by this time been supplied with fresh water eight or ten times, have lost all or nearly all their sugar. These exhausted slices are dropped from the tank and run through presses, and the pulp remaining is shipped away for cattle feeding. This apparatus is called the "diffu-sion battery," and when once started, fresh slices are supplied and juice is drawn off almost continuously. This juice contains much organic matter that is not sugar. It is run from the measuring tanks into tall cylindrical vessels which hold about 2,000 gallons each. To remove the coloring and other organic matter a thick milk of lime is added. Carbonic acid, which is heated to almost boiling by steam pipes, is passed into the liquid to free it from excess of lime. The juice is then forced by automatic pumps to the filter press, whence it comes quite clear and of a strawyellow color. The lime pressed out in cakes forms one of the best land plasters that can be used. The juice is limed, carbonated. and filtered again and then goes to the evaporator. These are a series of four large tubular boilers supplied with the exhaust steam from the engine; each has a greater vacuum than the one before it, and the juice as it flows along from one to the next is evaporated rapidly and at a low temperature. As it comes from the last it is a moderately thick syrup, and when it has been filtered it is ready to be boiled down to sugar. The syrup is pumped up into the vacuum tanks. These are large cylindrical bodies ten feet in diameter with oval top and bottom. Inside are copper steam pipes coiled, and a large air pump with an 18-inch cylinder keeps up a high vacuum and removes the evaporated water, so that the boiling down goes on rapidly and at a low temperature. In the sides of the pan are glass windows through which the mass may be watched. When the grains begin to appear fresh syrup is added until they are of the required size, then the water is evaporated and the steam is shut off, the pump stopped, a valve is opened at the bottom of the pan, and the whole mass is allowed to run into the

tanks below. The syrup is now dark and so thick that it will hardly run. It is drawn into large whirling drums which have their sides perforated with small holes and lined with brass gauze. As the drums revolve the sugar rises up along the sides, and the molasses is thrown out through the holes, while the sugar, too large to get through, remains sticking to the gauze. A spray of cold water and air is directed against the sugar to wash it, and a little bluing is added to give it brill-iancy. The mill is stopped, and the sugar. now white and moist, is dropped from the bottom and conveyed to a large horizontal revolving cylinder, which is heated by steam and called the granulator. There the sugar is dried, and the fine dust of sugar contained in the granulator, is drawn out by a suctionblower. The sugar passes through screens at the end of the granulator and is then ready for market. The molasses which is thrown off through the small holes in the whirling drums, is mixed with fresh syrup and boiled again, or is boiled alone and passed through the drums, and the brown sugar resulting is refined by mixing with fresh syrup. Throughout the whole process a careful chemical control is maintained, and the material is tested at every stage.

Beethoven (ba'to-vn), Ludwig von (1770-1827), a great German musical composer, b. at Bonn, studied under his father (a tenor singer), Pfeiffer, Van der Eden, and Neefe; began to publish in 1783; became assistant court organist in 1785; and was sent by the Elector of Cologne to Vienna in 1792, where he was the pupil of Haydn and Albrechtsberger, and acquired a high reputation for piano-forte extemporization before the merit of his written compositions was fully understood. In or near Vienna almost all his subsequent life was spent, his artistic tour in North Germany in 1796 being the most important break. He d. March 27, 1827. His later life was rendered somewhat morbid by his deafness, of which the first signs appeared in 1797. His best works were published after 1800, two periods being observable: the first from 1800 to 1814, comprising Symphonies 2-8; the opera Fidelio (originally Leonore), the music to Goethe's Egmont, and the overtures to Prometheus, Coriolanus, King Stephen, and Fidelio; the second (in which the poetic school of musicians find the germs of the subsequent development through Schumann, Wagner, and Liszt) comprising the 9th Symphony, the Missa Solemnis, and the Sonatas.

Beetle, a name often used as synonymous with the term Coleoptera, but restricted by others to include all those insects that have their wings protected by hard cases or sheaths, called elytra. Beetles vary in size from a mere point to the bulk of a man's fist, the largest, the elephant beetle of South America, being 4 inches long. The so-called "black beetles" of kitchens and cellars are not properly beetles at all, but cockroaches, and of the order Orthoptera. One of the most celebrated beetles is the Sacred Scarabæus of Egypt. It

#### Begonia

is noted for the method in which it deposits its eggs. This beetle rolls its eggs up into small bits of cow-dung and rolls the ball along the ground in search of a spot sufficiently soft to allow her to excavate a place for the eggs. The mode of progress is very peculiar. She turns her back upon the ball, grasps it with her hind legs and works backward, pushing the ball along as a horse backs a cart.

Perhaps the largest and handsomest of the beetle race belongs to the Dynastes family. These beetles are large-bodied and stoutlimbed, and reside in decaying vegetable matter, especially in rotton tree trunks or branches. They are of great service to the forest lands. Some are able to take a tree as soon as it is fallen and riddle the timber with their galleries. The rain penetrates these tunnels, lodges there, and thus decay sets in.

**Bego'nia**, an extensive genus of succulentstemmed herbaceous plants, order Begoniaceæ, with fleshy, oblique leaves of various colors, and showy unsexual flowers, the whole perianth colored. They readily hybridize, and



Begonia.

many fine varieties have been raised from the tuberous-rooted kinds. From the shape of their leaves they have been called *eleplant's ear*. Almost all plants of the order are tropical, and have mostly pink or red flowers.

ical, and have mostly pink or red flowers. **Behar'**, a prov. of Hindustan, in Bengal, area 44,139 sq. mi. Opium and indigo are largely produced. It is the most densely peopled prov. of India; pop. 23,127,104. Patna is the capital. The town of Behar, in the Patna district, contains some ancient mosques and the ruins of an old fort; it is a place of large trade. Pop. 48,008.

Behe' moth, the animal described in Job 40. The description is most applicable to the hippopotamus, and the word seems to be of Egyptian origin, and to signifiy "water ox." but it has been variously asserted to be the ox, the elephant, the crocodile, etc.

Behis tun (or Bis'utan), a mountain near a village of the same name in Persian Kurdistan, celebrated for the sculptures and cuneiform inscriptions cut upon one of its sides a rock rising almost perpendicularly to the height of 1,700 ft. These works, which stand

## Behring

about 300 ft. from the ground, were executed by the orders of Darius I, king of Persia, and set forth his genealogy and victories. To receive the inscriptions, the rock was carefully



**Rock Inscriptions at Behistun.** 

polished and coated with a hard, siliceous varnish. Their probable date is about 515 B.C. First copied and deciphered by Rawlinson.

Behring (or Bering) (bā'ring), VITUS (1680-1741), a famous navigator, b. at Horsens, Jutland. The courage displayed by him as captain in the navy of Peter the Great during the Swedish wars, led to his being chosen to command a voyage of discovery in the Sea of Kamtchatka. In 1728, and subsequently, he examined the coasts of Kamtchatka, Okhotsk, and the north of Siberia, ascertaining the relation between the northeastern Asiatic and northwestern American coasts. Returning from America in 1741, he was wrecked upon the desert island of Awatska (Bering's Island), and died there.

Behring's (or Bering) Strait, Sea, and Island.—The strait is the channel separating the continents of Asia and America, and connecting the North Pacific with the Arctic Ocean; breadth at the narrowest part, between Cape Prince of Wales and East Cape, about 36 mi.: depth in the middle from 29 to 30 fathoms. It is frozen in winter and seldom free from fog or haze. Though named after Vitus Bering, it was only fully explored by Cook in 1778. BERING'S SEA, sometimes called the Sea of Kamtchatka, is that portion of the North Pacific Ocean lying between the Aleutian Islands and Bering's Strait. BERING'S ISLAND, the most westerly of the Aleutian chain, off the east coast of Kamtchatka. It is uninhabited, and is without wood. A contention between the U.S. and Great Britain as to the capture of seals in Bering's Sea was referred by treaty to a court of arbitration in 1892, consisting of

seven persons, two representing the U.S., two representing Great Britain (one to be a Canadian), and one each from France, Sweden, and This court decided that the U.S. and Italy. Great Britain were each to prevent their subjects from killing or hunting seals within a radius of 60 mi. around the Pribilov Islands or in any part of the Pacific Ocean north of lat. 35° n. or e. of lon. 180° during the breeding season. The Pacific Ocean, according to the treaty of 1825, includes Bering Sea. The matter of damages was to be settled by diplomatic negotiations. In 1894 Secretary Gresham proposed to pay \$425,000 in full settlement of all damages, but Congress refused to ratify the agreement on the ground that the amount was excessive. It was later arranged that a tribunal consisting of one representative of the U.S. and one of Great Britain was to meet either at Victoria or San Francisco and award damages for seizures made. The president of the U.S. appointed a commission of scientists in 1896 to make investigation of the condition of fur seals of Alaska and report to Congress.

**Beira** ( $b\bar{a}'i$ - $r\bar{a}$ ), a province of Portugal. Area 9,248 sq. mi.; pop. 1,450,441. Chief town Coimbra. It is mountainous, and well watered, and productive of wine and olives. The heir apparent of the crown is styled Prince of Beira.

**Bejapoor'**, a ruined city of Hindustan, in the Bombay presidency, near the borders of the Nizam's dominions, on an affluent of the Krishna. It was one of the largest cities in India until its capture by Aurungzebe in 1686. The ruins, of which some are in the richest style of Oriental art, are chiefly Mohammedan; the principal being Mahomet Shah's tomb, with a dome visible for 14 miles, and a Hindu temple in the earliest Brahmanical style. Pop. 16,759.

Bekes (bā'kāsh), a town, Hungary, at the junction of the Black and White Körös, with a trade in flax, cattle, corn, wine, etc. It is noted for bee culture. Pop. 24,561. Bei (also belgar), the Hindu name of the Bengal quince. The fruit, which is not

**Bei** (also belgar), the Hindu name of the Bengal quince. The fruit, which is not unlike an orange, is slightly aperient; a perfume and yellow dye are obtained from the rind, and a cement from the mucus of theseed.

Bei and the Dragon, a book of the Apocrypha, forming a sort of addition to the book of Daniel. In it Daniel is shown as exposing the imposture of the priests of Bel and killing a sacred dragon.

**Beffast**, Waldo co., Me., on Penobscot Bay, 30 mi. s.w. of Bangor. Railroad: Belfast & Moorehead line; steamboat line to Boston. Industries: iron foundry, two shoe factories, two sash and blind, ax, and bath-brush factories. Surrounding country agricultural and some granite quarries. The town was first settled in 1770 and became a city in 1853. Pop. est. 1897, 5,500.

**Belfast'**, a seaport of Ireland, principal town of Ulster, and county town of Antrim. The chief educational institutions are the Queen's college, with about twenty professors, and the theological colleges of the Presbyteri-

ans and Methodists. Belfast Lough is about 12 mi. long, and 6 mi. broad at the entrance, gradually narrowing as it approaches the town. The harbor and dock accommodation is now extensive, new docks having been recently added. Belfast is the center of the Irish linen trade, and has the majority of spinning mills and power-loom factories in Ireland. The iron ship-building trade is also of importance, and there are breweries, distilleries, flour mills, oil mills, foundries, print works, tan yards, chemical works, rope works, etc. The commerce is large. Belfast is comparatively a modern town, its prosperity dating from the introduction of the cotton trade in 1777. It has suffered severely at various times from faction fights between Catholics and Protestants, the more serious having been in the years 1864, 1872, and 1886. Pop. 255,950.

**Beifort** (or Béfort) (bā-fōr), a small fortified town and territory of France, in the former dep. Haut Rhin. Pop. 25, 455. In the Franco-German War it capitulated to the Germans only a fter an investment of more than three months' duration (1870-71). It has since been greatly strengthened. Belfort, with the district immediately surrounding it, is the only part of the department of Haut Rhin which remained to France on the cession of Alsace to Germany. Area 234 sq. mi.; pop. 83,670.

**Beigaum** (bel-gaum), a town and fortress in Hindustan, Bombay presidency, district of Belgaum, on a plain 2,500 feet above the sealevel. In 1818 the fort and town were taken by the British, and from its healthy situation selected as a permanent military station. Pop. of town (including 7.921 for the cantonment), 40,737. The area of the district is 4,657 sq. mi., with a pop. of 1,013,261.

Belgium (bel'-jum), a European kingdom. Area 11.366 sq. mi. For administrative purposes it is divided into nine provinces: Ant-werp, Brabant, East Flanders, West Flanders, Hainaut, Liege, Limburg, Luxemburg, and Namur. Pop. 6,262,272. Brabant, the metropolitan province, occupies the center. The capital is Brussels; other chief towns are Ant-werp. Ghent, and Liége. The chief rivers are the Scheldt (or Schelde) and Meuse (or Maas); other navigable streams are the Dender, Dyle. Lys, Ourthe, Rupel, and Sambre. There are also a number of canals. The climate bears a considerable resemblance to that of the same latitudes in England; healthiest in Luxemburg and Namur, unhealthiest in the fens of Flanders and Antwerp. About one sixth of the whole surface of the kingdom is occupied by wood, Luxemburg and Namur being very densely wooded. These woods, the remains of the ancient forest of Ardennes, consist of hard wood, principally oak, and furnish valuable timber, besides many tons of bark both for the home tanneries and for exportation, and large quantities of charcoal. South Brabant also possesses several fine forests, among others that of Soignies; but in the other provinces the timber--mostly varieties of poplar-is grown in small copses and hedgerows.

About four fifths of the whole kingdom is

# Belgium

under cultivation, and nearly eleven twelfths of it profitably occupied, leaving only about one twelfth waste. Flemish husbandry partakes more of the nature of garden than of field culture, being largely spade-farming. The chief corn crops are wheat, rye, and oats, but they do not suffice for the wants of the country. . The chief green crops are potatoes, beets (partly for sugar), and flax, the last a most valuable crop in the Flemish rotation. The cattle are good and numerous. The horses of Flanders are admirably adapted for draught, and an infusion of their blood has contributed not a little to form the magnificent teams of the London draymen. The minerals of Bel-gium are highly valuable. They are almost entirely confined to the four provinces of Heineut Lizer Norme and Lycenburg and Hainaut, Liége, Namur, and Luxemburg, and consist of iron and coal, lead, manganese, and zinc, the first two minerals being far the most important. The iron-working district lies between the Sambre and the Meuse, and also in the province of Liége. At present the largest quantity of oil is raised in that of Namur. The coal field has an area of above 500 sq. mi. The quantity of coal mined annually is about 18,000,000 tons. The export, chiefly to France, is over 5,000,000 tons, forming one of the largest and most valuable of all Belgian ex-Belgium is also abundantly supplied ports. with building stone, pavement limestone, roofing-slate, and marble.

The industrial products of Belgium are very numerous, and are mostly of high character. The chief are those connected with linen, wool, cotton, metal, and leather goods. In respect of manufactures the fine linens of Flanders, and lace of South Brabant, are of European reputation. Scarcely less celebrated are the carpets and porcelain of Tournay, the cloth of Verviers, the extensive foundries, machine works, and other iron establishments of Liége. The commerce of Belgium is large own products, she is admirably situated for the transit trade of Central Europe, to which her fine harbor of Antwerp and excellent railway and canal system minister. The external trade is chiefly carried on by means of foreign vessels. The total burden of the Belgian mercantile marine is only about 80,000 tons. The railways have a total length of 2,800 miles, about three fourths belonging to the state.

The Belgian population is the densest of any European state (508 per sq. mi.), and is composed of two distinct races—Flemish, who are of German, and Walloons, who are of French extraction. The former, by far the more numerous, have their principal locality in Flanders; but also prevail throughout Antwerp, Limburg, and part of South Brabant. The latter are found chiefly in Hainaut, Liége, Namur, and part of Luxemburg. The Flemings speak a dialect of German, and the Walloons a corruption of French, with a considerable ble infusion of words and phrases from Spanish and other languages. French is the official and literary language, though Flemish is also successfully employed in literature.

# Belgium

Improved means of education are, now at the disposal of the people, every commune being bound to maintain at least one school for elementary education, the government paying one sixth, the province one sixth, and the commune the remainder of the expenditure. In all the large towns colleges have been established; while a complete course for the learned professions is provided by four universities, two of them, at Ghent and Liege, established and supported by the state; one at Brussels, the free university, founded by voluntary association; and one at Louvain, the Catholic university, founded by the clergy. By the Belgian constitution the executive power is vested in a hereditary king; the legislative, in the king and two chambers-the senate and the chamber of representatives—both elected by citizens paying direct taxes, the former for eight years, and the latter for four, but one half of the former renewable every four years, and one half of the latter every two years. Each of the prov-inces is administered by a governor and is subdivided into arrondissements administratifs and arrondissements judiciaires; subdivided again, respectively, into cantons de milice and cantons de justice de paix. Each canton is composed of several communes, of which the sum total is 2,514. The army is formed by conscription, to which every able man who has completed his nineteenth year is liable, and also by voluntary enlistment. The peace strength is 48,841 officers and men; in time of war 154,780. Besides this standing army there is a garde cirique numbering 43,647 active and 90,600 non-active men. The navy is confined to a few steamers and a small flotilla of gunboats. The coins, weights, and measures are the same, both in name and value, as those of France.

*llistory.*—The territory now known as Bel-gium originally formed only a section of that known to Cæsar as the territory of the Belgæ, extending from the right bank of the Seine to the left bank of the Rhine, and to the ocean. This district continued under Roman sway till the decline of the empire; subsequently formed part of the kingdom of Clovis; and then of that of Charlemagne, whose ancestors belonged to Landen and Herstal on the confines of the Ardennes. After the breaking up of the empire of Charlemagne Belgium formed part of the kingdom of Lotharingia under Charlemagne's grandson, Lothaire; Artois and Flanders, however, belonging to France by the treaty of Ver-dun. For more than a century this kingdom was contended for by the kings of France and the emperors of Germany. In 953 it was conferred by the Emperor Otto upon Bruno, archbishop of Cologne, who assumed the title of archduke, and divided it into two duchies, Upper and Lower Lorraine. In the frequent struggles which took place during the eleventh century Luxemburg, Namur, Hainaut, and Liége usually sided with France, while Brabant, Holland, and Flanders commonly took the side of Germany. The contest between the civic and industrial organizations and feudalism, which went on through the twelfth and thirteenth centuries, and in which Flanders

bore a leading part, was temporarily closed by the defeat of the Ghentese under Van Artevelde in 1382. In 1384 Flanders and Artois fell to the house of Burgundy, which in less than a century acquired the whole of the Nether-lands. The death of Charles the Bold at Nancy, in his attempt to raise the duchy into a kingdom (1477), was followed by the succession and marriage of his daughter, Mary of Burgundy, by which the Netherlands became an Austrian possession. With the accession, however, of the Austrian house of Hapsburg to the Spanish throne, the Netherlands, after a brief period of prosperity attended by the spread of the reformed religion, became the scene of increasingly severe persecution under Charles V and Philip II of Spain. Driven to rebellion, the seven northern states under William of Orange, the Silent, succeeded in establishing their independence, but the southern' portion, or Belgium, continued under the Spanish yoke.

From 1598 to 1621 the Spanish Netherlands were transferred as an independent kingdom to the Austrian branch of the family by the marriage of Isabella, daughter of Philip II, with the Archduke Albert of Austria. He died childless, however, and they reverted to Spain. After being twice conquered by Louis XIV, conquered again by Marlborough, coveted by all the powers, deprived of territory on the one side by Holland and on the other by France, the southern Netherlands were at length, in 1714, by the peace of Utrecht, again placed under the dominion of Austria, with the name of the Austrian Netherlands. During the Austrian War of Succession the French under Saxe conquered nearly the whole coun-try, but restored it in 1748 by the peace of Aix-la-Chapelle. On the succession of Joseph II, the "philosophic emperor," a serious insurrection occurred, the Austrian army being defeated at Turnhout, and the provinces forming themselves into an independent state as United Belgium (1790). They had scarcely been subdued again by Austria before they were conquered by the revolutionary armies of France, and the country divided into French departments, the Austrian rule being practically closed by the battle of Fleurus (1794), and the French possession confirmed by the treaties of Campo Formio (1797) and Lunéville (1801).

In 1815 Belgium was united by the Congress of Vienna to Holland, both countries together now forming one state, the Kingdom of the Netherlands. This union lasted till 1830, when a revolt broke out among the Belgians, and soon attained such dimensions that the Dutch troops were unable to repress it. A convention of the great powers assembled in London, favored the separation of the two countries, and drew up a treaty to regulate it; the National Congress of Belgium offering the crown, on the recommendation of England, to Leopold, prince of Saxe-Coburg, who acceded to it under the title of Leopold I, on July 21, 1831. In November of the same year the five powers guaranteed the crown to him by the

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treaty of London, and the remaining difficulties with Holland were settled in 1839, when the Dutch claims to territory in Limburg and Luxemburg were withdrawn. The reign of Leopold was for Belgium a prosperous period of thirty-four years. Leopold II suc-ceeded his father in 1865. In recent years the chief feature of Belgian politics has been a keen struggle between the clerical and the liberal party. Till 1878 the clerical party maintained the upper hand, but to a large extent by corruption at the elections. In 1877 a bill was passed to put down corruption, and to increase the number of town deputies to the chamber of representatives; and at the next elections, in June, 1878, the liberals gained a majority, which they lost in 1884. In 1885, on the constitution by the Congress of Berlin of the Congo Free State, in which Leopold II had shown an active interest, he was invited to become its sovereign, and has since held that title.

**Beigrade** (bel-grad'), capital of Servia. It manufactures carpets, silk stuffs, hardware, cutlery, and saddlery, and carries on an active trade. Being the key of Hungary, it was long an object of flerce contention between the Austrians and the Turks, remaining, however, for the most part in the hands of the Turks until its evacuation by them in 1867. Since the treaty of Berlin (July, 1878) it has been the capital of an independent state. Pop. 54-763,

**Be'llal**, a word which by the translators of the English Bible is often treated as a proper name, as in the expressions, son of Belial, man of Belial. In the Old Testament, however, it ought not to be taken as a proper name, but it should be translated wickedness or worthlessness. To the later Jews Belial seems to have become what Pluto was to the Greeks, the name of the ruler of the infernal regions; and in 2 Cor. 6:15 it seems to be used as a name of Satan, as the personification of all that is bad.

Belisa' rius (505-565), the general to whom the Emperor Justinian chiefly owed the splendor of his reign; b. in Illyria about 505 A. D. He obtained the chief command of an army on the Persian frontiers, and in 530 gained a victory over a superior Persian army. In the year 532 he checked the disorders in Constantinople. He took Carthage and led Gelimer, the Vandal king, in triumph through Constantinople. He stormed Naples, held Rome for a year, took Ravenna, and led captive Vitiges, the Gothic king.

Belize (be-lez'), the capital and only trading port of British Honduras, situated at the mouth of the southern arm of the river Belize. Exports: chiefly mahogany, rosewood, logwood, cedar, cocca-nuts, and sugar. Pop. about 5,800.

Bell, a hollow, somewhat cup-shaped, sounding instrument of metal. The metal from which bells are usually made (by founding) is an alloy, called bell-metal, commonly composed of eighty parts of copper and twenty of tin. The proportion of tin varies, however, from one third to one fifth of the weight of the copper, according to the sound required, the size of the bell, and the impulse to be given. The clear-



ness and richness of the tone depend upon the metal used, the perfection of its casting, and also upon its shape; it having been shown by a number of experiments that the well-known shape with a thick lip is the best adapted to give a perfect sound. The depth of a tone of a bell increases in proportion to its size. A bell is divided into

Ancient Crotal.

the body or barrel, the ear or cannon, and the clapper or tongue. The kp or sound-bow is that part where the bell is struck by the clapper.

It is uncertain whether the jangling instruments used by the Egyptians and Israelites can be correctly described as bells; but it is certain that bells of a considerable size were in early use in China and Japan, and that the Greeks and Romans used them for various purposes. They are said to have been first in--troduced into Christian churches about 400 A. D. by Paulinus, bishop of Nola, in Campa-nia (whence campana and nola as old names of bells), although their adoption on a wide scale does not become apparent until after the year 550, when they were introduced into France. Benedict Biscop, abbot of Wearmouth, seems to have imported bells from Italy to England in 680, but their use in Ireland and Scotland is probably of earlier date. The oldest of those existing in Great Britain and Ire-land, such as the "bell of St. Patrick's will" and St. Ninian's bell, are quadrangular and made of thin iron plates hammered and riveted together. Until the thirteenth century they were of comparatively small size, but after the casting of the Jacqueline of Paris (64 tons) in



1400, their weight rapidly increased. Among the more famous bells are the bell of Cologne, 11 tons, 1448; of Dantzic, 6 tons, 1453; of Halberstadt, 7‡, 1457; of Rouen, 16, 1501; of Breslau, 11, 1507; of Lucerne, 7‡ 1636; of Oxford, 7‡, 1680; of Paris, 12‡, 1680; of Bruges, 10‡, 1680; of Vienna, 17‡, 1711; of Moscow (the monarch of bells), 193, 1736; three other bells at Moscow ranging

Queen Mary's Hand Bell-from 16 to 31 tons, and a fourth, of 80 tons, cast in 1819; the bell of Lincoln (Great Tom), 5‡, 1834; of York Minster (Great Peter), 10‡, 1845; of Montreal, 13‡, 1847, the largest bell in America; of Westminster (Big Ben), 15‡, 1856; (St. Stephen), 13‡, 1858; the Great Bell of St. Paul's, 17‡, 1882. Others are the bells of Ghent (5), Görlitz (10‡), St. Peter's, Rome (8), Antwerp (7‡), Olmutz (18), Brussels (‡), Novgorod (31), Pekin (53‡). Besides their use in churches bells are employed for various purposes, the most common use being to summon attendants or domestics in private houses, hotels, etc. Bells for this purpose are of small size and may be held in the hand and rung, but most commonly are rung by means of wires stretched from the various apartments to the place where the bells are hung. Bells rung by electricity are now becoming common in hotels and other establishments.

Bells, as the term is used on shipboard, are the strokes of the ship's bell that proclaim the hours. Eight bells, the highest number, are rung at noon and every fourth hour afterward: *i. e.*, at 4, 8, 12 o'clock, and so on. The intermediary periods are indicated thus: 12:30, 1 bell; 1 o'clock, 2 bells; 1:30, 3 bells, etc., until the eight bells announce 4 o'clock, when the series recommences: 4:30, 1 bell; 5 o'clock, 2 bells, etc. The even numbers of strokes thus always announce hours, the odd numbers halfhours.

The manufacture of a bell is a difficult and interesting process, and the success of a bell depends in the first place on the amount of accuracy with which its dimensions have been figured out beforehand. The thickness of the bell's edge must bear a certain proportion to its diameter and height. It must also be of just the right thickness in its various parts. There are exact rules for calculating the dimensions and the proportions of the metal to the size of the bell. Copper and tin are used for large bells, but the mixture varies widely. About four parts of copper are used with each part of tin. When the design has been made for a bell it goes to a pattern maker. This workman cuts out two long strips of wood, one of them just the contour of the inside of the projected bell and the other the contour of the outside. A basin for the mold is made in the foundry. It is constructed in the earth and consists mainly of fire brick and clay, a stout post perfectly plumb is planted in the center and is of the same height as the proposed bell. The two contour pieces are pivoted to the post so that they will swing around in either direction. In the center of the basin and around the post is built a little furnace of brick so large that it almost reaches the sweep of the inside of the contour leg of the compass. It is then pieced out on top with fire clay until it exactly conforms to the sweep of the contour pieces. It is made very smooth and is allowed to harden. This forms a core. Then grease is applied, then more clay, until it reaches and is swept smooth by the upper contour leg. This covering of clay is exactly the size and shape of the projected bell. If there are to be any designs or inscriptions on the bell they are worked in in reverse order and plugged in with wax. When it is dry it is smeared with grease and another layer of clay, called a mantle, which is packed on roughly, a hole being left in the top through which the molten metal can be poured. After this has hardened, the whole mass is shaped by building a hot fire in the interior furnace. The wax in the inscrip-

18

tions and the grease vaporize and pass off. The mantle, or the mold for the outer part of the bell, can now be easily lifted off. When the next layer of clay is removed and the mantle replaced, the space left between it and the core furnishes the bell mold. The great mass of bell metal is brought from the furnace and poured into the mold. Small pieces of broken bells are thrown into the crucible to cool the metal. When the mold is full the pouring is complete. The mold is left for several weeks to grow cool and shrink because if it were broken open at once the bell would cool more rapidly on the outside than on the inside and would break. When the mold is taken off, the bell is tested and if it gives out a single pure tone it is regarded as a perfect cast. If the tone is not pure the bell can sometimes be tuned by filing away parts of the inside surface.

Bell, ALEX. GRAHAM, a noted physicist, b. in Edinburgh, 1847. He was trained in his father's system of removing impediments of speech, in the university of Edinburgh, and matriculated 1867, at London university, but left on account of failing health. He removed to Canada, 1870, where he designed and partly constructed the telephone exhibited in Philadelphia, 1870. His residence had been in Boston from 1872, being professor of Vocal Physiology at Boston university. His fame and fortune are due to the commercial importance of the telephone of which he holds the patent. Elisha Gray filed his caveat in the patent office two hours after Bell's application. After Bell, a large number of experimenters appeared, suggesting endless modification but no essentially new principle. In a lecture delivered by Reis in Frankfort, in the year 1861, an apparatus was described which has given rise to much discussion concerning priority of invention.

The *Photophone*, the joint work of Bell and Taintor, in which a vibratory beam of light is substituted for a wire in conveying speech, was introduced to the public, 1880. In 1881 Bell and Taintor, with an improved form of Hughes's induction balance, attempted unsuccessfully to locate the ball which caused Garfield's death. Another interesting experiment of Bell's was attempting to record speech by photographing the vibrations of a jet of water. Bell resides in Washington and is a member of many learned societies. He introduced into the U. S. his father's system of educating deaf mutes.

**Bell**, HENRY (1767–1830), the first successful applier of steam to the purposes of navigation in Europe, was born in Linlithgowshire. In 1708 he turned his attention specially to the steamboat, the practicability of steam navigation having been already demonstrated. In 1812 the *Comet*, a small thirty-ton vessel built at Glasgow under Bell's direction, and driven by a three horse-power engine made by himself, commenced to ply between Glasgow and Greenock, and continued to run till she was wrecked in 1820. This was the beginning of steam navigation in Europe. Bell is also cred-

#### **Belladonna Lily**

ited with the invention of the "discharging machine" used by calico-printers.

Bell, JOHN (1797-1869), born near Nashville. Tenn. He was graduated at what is now the university of Nashville in 1814, was admitted to the bar in 1816, and was elected to the state senate in 1817. He served in Congress as a Whig, 1827-41, winning reputation as a debater. He became an ardent supporter of the protective tariff. He supported General Jack-son as candidate for the Presidency in 1832. In 1834 he was elected speaker of the House of Representatives. He favored the reception of petitions for the abolition of slavery in the District of Columbia. In 1841 he was ap-pointed secretary of war by President Harrison. He was in the U.S. Senate 1849-59. He opposed the Texas annexation policy, advocated Henry Clay's compromise of 1850, voted against the Kansas-Nebraska bill of 1850, and opposed the repeal of the Missouri Compro-Mr. Bell was nominated for President, mise. with Edward Everett for Vice-President, by a convention of the "Constitutional Union" in 1860, when secession was threatened by the Southern States, and he received the electoral votes of Tennessee, Virginia, and Kentucky. He, with seven other citizens of Tennessee, issued an address recommending his state to preserve an armed neutrality in 1861, and on April 23, 1861, he delivered an address in Nashville in support of the Southern policy. Mr. Bell did not serve in the Civil War.

Belladon' na, a European plant, the deadly nightshade. It is native in Britain. All the parts of the plant are poisonous, and the incautious eating of the berries has often produced death. The inspissated juice is commonly known by the name of extract of belladonna. It is narcotic and poisonous, but is of great value in medicine, especially in nervous ailments. It has the property of causing the pupil of the eye to dilate. The fruit of the plant is a dark, brownish-black, shining berry. The name signifies "beautiful lady," and is said to have been given from the use of the plant as a cosmetic.

Belladonna Lily, so called on account of its beauty, with delicate blushing flowers clus-



Belladonna. a .- flower. b.-fruit.

### Bellaire

tered at the top of a leafless flowering stem. It is a native of the Cape of Good Hope and of the West Indies.

Bellaire, Belmont co., O., 5 mi. below Wheeling, on the Ohio; numerous manufacturing works. Pop. 9,934.

**Bellamy**, EDWARD, b. in Massachusetts, 1850; was admitted to the bar in 1871. He was connected with the Springfield, Mass., and New York press, and in 1888 published *Looking Back*ward, a dream of perfect socialism.

**Bellary** (bel-ä'ri), a town in India, presidency of Madras, capital of a district of the same name, 280 mi. n. w. of Madras; a military station, with a fort crowning a lofty rock, and other fortifications. Pop. 59,467. The district was ceded to the British in 1800. Area 5,975 sq. mi; pop. 900,126.

Bellay (bel-s), JOACHIM DU (1524-1560), distinguished French poet, known as the French Ovid. In 1555 he became canon of Notre Dame, and a short time before his death he was made archbishop of Bordeaux. Spenser translated some of his sonnets into English.

**Bell-bird**, the name given to a South American passerine bird, so named from its sonorous, bell-like notes; and also to a bird of Australia, a bird of the family Meliphagidæ (honey-suckers), whose notes also resemble the sound of a bell.

**Bell-crank**, in machinery, a rectangular lever by which the direction of motion is changed through an angle of  $90^{\circ}$ , and by which its velocity ratio and range may be altered at pleasure by making the arms of different lengths. It is much employed in machinery, and is named from its being the form of crank employed in changing the direction of the bell wires of house bells.

**Bell-Alliance**, a farm 13 mi. s. of Brussels, famous as the position occupied by the center of the French Army in the battle of Waterloo, June, 1815.

**Belic-Isle** (bel-**č**) (or Belle-Isle-en-Mer), a French Island in the Bay of Biscay, dcp. of Morbinan, 8 mi. s. of Quiberon Point; length 11 mi.; greatest breadth 6 mi. Pop. 10,000,177, largely engaged in the pilchard fishing. The capital is Le Palais on the n. e. coast.

**Belle-Isle** (bel-il), a rocky island, 9 mi. long, at the eastern entrance to the Strait of Belle-Isle, the channel, 15 mi. wide, between Newfoundland and the coast of Labrador. Steamers from Glasgow and Liverpool to Quebec round the north of Ireland commonly go by this channel in summer as being the shortest route.

**Beller' ophon** (or Hippon'ous), in Greek mythology, a hero who, having accidentally killed his brother, fled to Protus, king of Argos, whose wife, Antæa, fell in love with him.

Belles-lettres (bel-let-r), polite or elegant literature; a word of somewhat vague signification. Rhetoric, poetry, fiction, history, and criticism, with the languages in which the standard works in these departments are written, are generally understood to come under the head of belles-lettres.

Beileville, St. Clair co., Ill., on Richland

Creek, 14 mi. s. e. of St. Louis. Railroads: Illinois Central; L. & N.; L. E. & St. L.; St. L. B. & S. Industries: nail mills, four flouring mills, four iron foundries, machine shops, keg, clothing, and glass factories, and four farm implement factories. Surrounding country agricultural and mineral. The town was first settled in 1814 and became a city in 1850. Pop. est. 1897, 22,000.

**Belleville**, a town of Canada, prov. Ontario, capital of Hastings co., on the Bay of Quinté, at the mouth of the Moira, with flourishing trade and manufactures. It is rather a fine town, and has a Methodist Episcopal university for men and women (two colleges). Pop. 10,100.

**Bellini** (bel- $\bar{e}$ - $n\bar{e}$ ), JACOPO, and his two sons, GENTILE and GIOVANNI, the founders of the Venetian school of painting. The father excelled in portraits, but very little of his work is extant. He d. about 1470. Gentile was b. in 1421, and in 1479 went to Constantinople, Mohammed II having sent to Venice for a skillful painter; d. at Venice in 1501. Giovanni was b. about 1424, and d. about 1516. He contributed much to make oil-painting popular, and has left many noteworthy pictures. Titian and Giorgione were among his pupils.

Bellini (bel-ē'nē). VINCENZO (1802-1835), a celebrated composer, b. at Catania in Sicily. He was educated at Naples under Zingarelli, commenced writing operas before he was twenty, and composed for the principal musical establishments in Europe. His most celebrated works are I Montecchi e Capuleti (1829): La Somnambula (1831); Norma, his best and most popular opera; and I Puritani (1834). Bellmann, KARL MICKEL (1740-1795), the

Bellmann, KARL MICKEL (1740-1795), the most original among the Swedish lyric poets. His songs, in which love and liquor are common themes, are sung over the whole country, and "Bellmann" societies hold an annual festival in his honor.

Bello'na, the goddess of war among the Romans, often confounded with Minerva. She was the sister of Mars, or, according to some, his daughter or his wife. She is described by the poets as armed with a bloody scourge, her hair disheveled, and a torch in her hand.

Bel'lows, an instrument or machine for producing a strong current of air, and principally used for blowing fires, either in private dwellings or in forges, furnaces, mines. etc. It is so formed as, by being dilated and contracted, to inhale air by an orifice which is opened and closed with a valve, and to propel it through a tube upon the fire. It is an ancient contrivance, being known in Egypt, India, and China many ages ago, while forms of it are used among savage tribes in Africa. Bellows of very great power are called blowing machines, and are worked by machinery driven by steam. The blowing machines now almost exclusively used for blast furnaces are of the cylinder and piston type. At first the blowing cylinders had the power of propelling a blast only when the piston was moving in one direction. The cylinder engines of the present day

#### **Bellows-fish**

may be classed in two chief systems, according as the cylinder is placed horizontally or vertically. In the former case the steam and blast cylinders are usually in one line, the same rod carrying the pistons of both, and being guided on both sides, while a fly-wheel is employed as regulator. In the vertical systems the steam and blowing cylinders are sometimes similarly connected, but in the larger engines, they are generally placed one at each end of a beam connecting their pistons. Another kind of blow-ing engine consists of a barrel-shaped vessel supported horizontally by the two ends of its axis. The cylinder is divided longitudinally by a plane extending from the middle of the internal surface above (the barrel being in its position of rest) to near the opposite side. Suppose the cylinder partly filled with water and made to turn a little way round on its axis, the air on one side will be compressed by the water, while that on the other will be rarefled. A valve opening outward from the condensed side admits the air to a cavity from which a nozzle pipe proceeds, while a valve opening inward on the rarefled side admits external air. With additional and corresponding values the process is repeated on the reverse oscillation of the cylinder. Thus by swinging the cylinder from side to side, by a crank and rod connected with the engine, alternate puffs of air are propelled into a regulative air chest of special construction, which then supplies a steady blast.

Fan-blast machines are frequently employed in the cupola furnaces where anthracite is burned. In one common form the fan consists of four spokes of a rimless wheel, tipped with vanes and made to rotate in a cylindrical chest, in which it has often a slightly eccentric position. There are openings on both sides round the spindle for admission of air, which, sucked in by the centrifugal action of the fan as it quickly rotates, flows toward the vanes, and is driven through an exit pipe attached to another part of the cylinder. A new form of blower has a chamber in which three drums of equal size are enclosed, two in a line below and one above; the upper one is provided with wings, and the two lower have wide slots along their entire length, allowing the wings to enter in the course of rotation. The function of the two lower drums is to supply alternately abutments to prevent the escape of the air. Thev are caused to revolve in proper relation with the motion of the upper drum by spur-wheels on the journals, which mesh into another spurwheel on the shaft of the upper drum. In the moving parts of this machine there are no parts that come into actual contact except the teeth of the spur-wheels.

Bellows-fish, a fish, called also the Trumpetfish or Sea-snipe. It is not uncommon in the Mediterranean. It is 4 or 5 inches long, and has an oblong oval body and a tubular elongated snout, which is adapted for drawing from among sea-weed and mud the minute crustacea on which it feeds.

Bell Rock (or inch cape), a dangerous reef surmounted by a lighthouse, situated in the German Ocean about 12 mi. from Arbroath, nearly opposite the mouth of the river Tay. The lighthouse was erected in 1808-11 by Robert

Stevenson from Rennie's plan at a cost of upward of \$300,-000. It rises to a height of 120 feet; has a revolving light showing alternately red and white every minute, and visible for upward of 15 mi. It also contains two bells which are rung during thick weather. The reef is partly uncovered at ebb-tides.

Belluno (bel-lö'nō), a city of Northern Italy, capital of a province of the same name, on the Piave, 48 mi. n. of Venice. Has a cathedral, a handsome theater, etc.; and manufactures of silk, strawplait, leather, etc. Pop. 16,-The province has an Ō00. area of 1,271 sq. mi. and a pop. of 195.419.



Section of Beil

Beloit, Rock co., Wis., 69 Rock Lighthouse. mi. s.w. of Milwaukee, the seat of Beloit college; various factories. Pop. est. 1897, 7,000

Bel'per, a town, England, Derbyshire, in a valley, on the Derwent, 7 mi. n. of Derby, with large cotton mills, foundries, etc., and in the neighborhood numerous collieries. Pop. 10,420.

Belshaz'zar, the last of the Babylonian kings, who reigned conjointly with his father. Nabonadius. He perished B. c. 538, during the successful storming of Babylon by Cyrus. This event is recorded in the book of Daniel.

Belt, belting, a flexible endless band, or its material, used to transmit motion or power from one wheel, roller, or pulley to another,



#### Belt Lacing.

and common in various kinds of machinery. Driving belts are usually made of leather or india-rubber, or some<sup>•</sup>woven material, but ropes and chains are also used for the same purpose.



There are a number of ways of lacing a belt, but every machinist has his own favorite method. One rather complex but effective method is to punch 24 holes, 13 on one side and 11 on the other side, as shown in cut. The lace is doubled in the center of its length and run through the middle hole (13) of the second row on that side of the joint which contains 11 holes. The lace is passed over and under from side to side, bringing both ends of the lace out of the middle hole (1), and there the ends are tied on the outside of the belt. By this means there is no crossing of the lace on either side, and there can be no side play and the lace will not creep. When a light belt is called upon to do little work, it is customary to lace the belt shoe-string fashion, back and forth through single rows of holes, always beginning the lacing in the center of the belt. Imperfectly adjusted belting is a fruitful cause of power waste, and a poorly laced joint is the principal cause of loss of transmitted energy. If a lace be crossed on the under side the belt is raised from the pulley every time the joint comes around, and not only is the power wasted, but the lace is soon worn through. Sometimes the lace on the other side is covered by a piece of belting, scraped thin and cemented to the joint. In many cases the ends of the belt are scarfed, the laps cemented together and the whole strengthened by rivets. For lacing wide belts which are too heavy to be stretched by hand, the stretching clamp is used. This holds the ends firmly until the belt is laced.

**Belt**, The Great and Little, two straits connecting the Baltic with the Cattegat, the former between the islands of Zealand and Funen, about 18 mi. in average width; the latter between Funen and the coast of Schleswig, at its narrowest part not more than a mile in width.

Bei'tane, a sort of festival formerly observed in Ireland and Scotland, and still kept up in a fashion in some remote parts. It is celebrated in Scotland on the first day of May usually by kindling fires on the hills and eminences. In early times it was compulsory on all to have their domestic fires extinguished before the Beltane fires were lighted, and it was customary to rekindle the former from the embers of the latter. This custom no doubt derived its origin from the worship of the sun.

Belton, Bell co., Tex., 55 mi. n.e. of Austin, the seat of the Chamberlain institute; two banks, and a Masonic temple. Pop. 4,300.

Beiuga (be-lö'ga), a kind of whale or dolphin, the white whale or white fish, found in the northern seas of both hemispheres. It is from 12 to 18 feet in length, and is pursued for its oil (classed as "porpoise oil") and skin. In swimming the animal bends its tail under its body like a lobster, and thrusts itself along with the rapidity of an arrow. A variety of sturgeon found in the Caspian and Black Seas is also called beluga.

**Beizo'ni,** GIOVANNI BATTISTA (1778-1823) (John Baptist), an enterprising traveler, was b. at Padua. In 1803 he emigrated to Eng-

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land. In 1815 he visited Egypt, where he made a hydraulic machine for Mehemet Ali. He then devoted himself to the exploration of the antiquities of the country. He succeeded in transporting the bust of Memnon (Rameses II) from Thebes to Alexandria, from whence it came to the British Museum; explored the great temple of Rameses II at Abu-Simbel; opened the tomb of Seti I, from which he obtained the splendid alabaster sarcophagus bought by Sir John Soane for \$10,000, and he also succeeded in opening the second of the pyramids of Ghizeh.

**Bembecidæ** (-bes'i-dē), a family of wasp-like insects with stings, mostly natives of warm countries, and known also as sand-wasps. The female excavates cells in the sand, in which she deposits, together with her eggs, various larvæ or perfect insects stung into insensibility, so as to furnish support for her progeny when hatched. They are very active, fond of the nectar of flowers, and delight in sunshine. Bembex is the typical genus of this family.

**Ben**, oil of, the expressed oil of the bennut, the seed of the ben or horse-radish tree of India. The oil is inodorous, does not become rancid for many years, and is used by perfumers and watchmakers.

**Benares** (be-nä'rez), a town in Hindustan, Northwest Provinces, administrative headquarters of a district and division of the same name, on the left bank of the Ganges, from which it rises like an amphitheater, presenting a panorama of temples, mosques, palaces, and other buildings. It is the headquarters of the Hindu religion. Benares carries on a large trade in the produce of the district and manufactures silks, shawls, embroidered cloth, jewelry, etc. The population, including the neighboring cantonments at Sikraul (Secrole), 229,467. The district has an area of 1,009 sq. mi., and a pop. of 921,943.

Bencoo'len, a seaport of Sumatra, on the s. w. coast. The English settled here in 1685, and retained the place and its connected territory till 1825, when they were ceded to the Dutch in exchange for the settlements on the Malay Peninsula: since then Bencoolen has greatly declined. Pop. 15,000. Bender', a town and fortress of Russia, in

**Bender'**, a town and fortress of Russia, in Bessarabia, on the Dniester. Its commerce is important, and it carries on some branches of manufacture. Pop. 24,625.

**Ben'edict**, the name of fourteen popes from 574 to 1758.

Benedict, SIR JULIUS (1804–1885), pianist and composer, b. at Stuttgart, d. at London. He took up his residence in England in 1835, and was knighted in 1871. Principal works: the operas of *The Gypsy's Warning*, *Undine*, St. Cecilia, Lily of Killarney, and *Graziella*.

Benedic'tine, a liquor prepared by the Benedictine monks of the abbey of Fécamp, in Normandy, France, consisting of spirit (fine brandy) containing an infusion of the juices of plants, and said to possess digestive, antispasmodic, and other virtues, and to have

prophylactic efficacy in epidemics. Made in

the same way since 1510. **Benefit of Clergy** was a privilege by which formerly in England, the clergy accused of capital offenses were exempted from the jurisdiction of the lay tribunals, and left to be dealt with by their bishop. Though originally it was intended to apply only to the clergy or clerks, latterly every one who could read was considered to be a clerk, and the result of pleading "his clergy " was tantamount to acquittal. A layman could only receive the benefit of clergy once, however, but he was not allowed to go without being branded on the thumb, a punishment which latterly might be commuted to whipping, imprisonment, or transportation. Abolished in 1827.

Beneven' to, a city of Southern Italy, the see of an archbishop, in a prov. of same name, on a hill between the rivers Sabato and Calore, occupying the site of the ancient Beneventum, and largely built of its ruins. Few cities have so many remains of antiquity, the most perfect being a magnificent triumphal arch of Trajan, built in 114. The cathedral is a building of the twelfth century in the Lombard-Saracenic style. Pop. 22,699. The prov. has an area of 680 sq. mi., and a pop. of 238,425. Bengai (ben-gal'), a presidency of British India, which includes the whole of British India except what is under the governors of

Madras and Bombay; area 151,543 sq. mi.; pop. 71.346,987. The feudatory states connected with it have an aggregate area of 36,634 sq. mi., and a pop. of 2,845,405.

As a whole Bengal consists of plains, there being few remarkable elevations, though it is surrounded with lofty mountains. It is intersected in all directions by rivers, mostly tributaries of its two great rivers, the Ganges and Brahmaputra, which annually, in June and July, inundate a large part of the region. The country is subject to great extremes of heat, which, added to the humidity of its surface, renders it generally unhealthy to Europeans. The seasons are distinguished by the terms hot (March to June), rainy (June to October), and cold (the remainder of the year). The most unhealthy period is the latter part of the rainy season. The mean temperature of the whole year varies between  $80^\circ$  F. in Orissa and  $74^\circ$  F. in Assam, that of Calcutta being 79°. In the hill station of Darjeeling the mean is about 54°, occasionally falling as low as 24° in the winter. The heaviest rainfall occurs in Eastern Bengal, the annual average amounting to over 100 in., an amount greatly exceeded in certain localities. Besides rice and other grains, which form along with fruits the principal food of the population, there may be noted among the agricultural products indigo, opium, cane-sugar, tobacco, betel, cotton, and jute and sunn plants. Tea is now extensively grown in some places, notably in Darjeeling district and Chittagong. Cinchona is cultivated in Darjeeling and Sik-The forests cover 12,000 sq. mi., the kim. principal forest trees being the sal on the Himalaya slopes, sál and teak in Orissa. Wild

animals are most numerous in the Sundarbans and Orissa, snakes being remarkably abun-dant in the latter district. The principal minerals are coal, iron, and salt. Coal is worked at Raniganj, in Bardwan district, where the seams are about 8 ft. in thickness, and iron in the district of Bírbhúm, in the same division. Salt is obtained from the maritime districts of Orissa. The principal manufactures are cotton piece-goods of various descriptions, jute fabrics. blanketing, and silks. Muslins of the most Muslins of the most beautiful and delicate texture were formerly made at Dacca, but the manufacture is almost extinct. Sericulture is carried on more largely in Bengal than in any other part of India, and silk weaving is a leading industry in many of the districts. The commerce, both internal and external, is very large. The chief exports are opium, jute, indigo, oil-seeds, tea, hides and skins, and rice; the chief import is cot-ton piece-goods. The foreign trade is chiefly with Britain, China, the Straits Settlements, France, the U. S., and Ceylon. Internal communication is rendered easy by a very complete railway and canal system, while the boat trade on the rivers is, for magnitude and vari-ety, quite unique in India. The people of Bengal are mainly of Hindu race except in the valleys of Chittagong, where they are chiefly Bur-mese. Over 20,000,000 are Mohammedans in religion, more than double this profess Hindu-ism. The dialects spoken are Bengálí in Bengal proper, Hindí in Patna division, and Uríya in Orissa. The first rudiments of education are usually given in the primary schools that have been developed out of the native schools, and are now connected with government. There are also a number of secondary and superior schools established by government, including eight government colleges. The highest educational institution is the Calcutta university, the chief function of which is to examine and confer degrees. The population of Bengal beyond the capital, Calcutta, and its suburbs, is largely rural. There are alto-gether 33 towns with upward of 20,000 inhabitants, and 200 with over 5,000, but many of these towns are mere collections of rural hamlets in which all the operations of husbandry are carried on.

The first of the East India Company's settlements in Bengal were made early in the seven-teenth century. The rise of Calcutta dates from the end of the same century. The greater part of Bengal came into the hands of the East India Company in consequence of Clive's victory at Plassy in 1757, and was formally ceded to the Company by the nabob of Bengal in 1765. Chittagong had previously been ceded by the same prince, but its government under British administration was not organized till 1824. Orissa came into British hands in 1803. In 1858 the country passed to the crown, and since then the history of Bengal has been, on the whole, one of steady and peaceful progress.

Bengal, Bay of, that portion of the Indian Ocean which lies between Hindustan and Farther India, or Burmah, Siam, and Malacca,

and may be regarded as extending south to Ceylon and Sumatra. It receives the Ganges, Brahmaputra, and Irrawaddy. Calcutta, Rangoon, and Madras are the most important towns on or near its coasts.

**Benga'li**, one of the vernacular languages of India, spoken by about 50,000,000 people in Bengal, akin to Sanskrit and written in characters that are evidently modified from the Devanågari (Sanskrit). Its use as a literary language began in the fourteenth century with poetry. Large numbers of Bengali books are now published, as also newspapers. A large number of words are borrowed from Sanskrit literature.

**Benguela** (ben-gā'là), a district belonging to the Portuguese on the w. coast of South Africa; area, perhaps 150,000 sq. mi. Copper, silver, iron, salt, sulphur, petroleum, and other minerals are found. Pop. est. at 2,000,000. The capital, also called Benguela (or San Felipe de Benguela), is situated on the coast, on a bay of the Atlantic, in a charming but very unhealthy valley. It was founded by the Portuguese in 1617, and was formerly an important center of the slave-trade, but has now only a spasmodic trade in ivory, wax, gum copal, etc. Pop. about 3,000.

**Beni** (bā'nē), a river, South America, state of Bolivia. It rises in the eastern slopes of the Andes, and after a course of 900 mi. joins the Mamore to form the Madeira, which flows into the Amazon near Serpa.

Benin', a negro kingdom of West Africa, on the Bight of Benin, extending along the coast on both sides of the Benin River, w. of the lower Niger, and to some distance inland. The chief town is Benin (pop. 15,000), situated on the river Benin, one of the mouths of the Niger. The country, which gradually rises as it recedes from the coast, is well wooded and watered, and rich in vegetable productions. Cotton is indigenous, and woven into cloth by the women, and sugar-cane, rice, yams, etc., are grown. The religion is Fetichism, and human sacrifices are numerous. There is considerable trade in palm-oil. In consequence of a massacre of a British mission, the king was deposed, and the country annexed by the British in 1897.

Benjamin, JUDAN P. (1811-1884), "the brains of the Confederacy," b. at St. Croix, W. I., d. at Paris; studied law in New Orleans; elected U. S. senator for Louisana 1857, and became a member of the cabinet under Jefferson Davis (1861); in 1865 escaped to England; soon became famous as a lawyer there.

**Benlo'mond,** a mountain of Scotland in Stirlingshire, rising to a height of 3, 192 feet and giving a magnificent prospect of the vale of Stirling, the Lothians, the Clyde, Ayrshire, Isle of Man, hills of Antrim, etc.

**Ben-Mac-Duhi** (or Ben-Muich-Dhui) (-mikdö'i), the second highest mountain in Scotland, situated in the southwest of Aberdeenshire, on the borders of Banffshire, forming one of a cluster of lofty mountains, among which are Brae-riach, Cairntoul, and Cairngorm. Height, 4,290 feet, **Benne** (ben'e) **oil**, a valuable oil expressed from the seeds of *Besamum orientale* and *S. indicum*, much cultivated in India and Egypt, etc., and used for similar purposes with olive oil. Also called *sesamum oil* and *gingelly oil*.

Bennett, JAMES GORDON (1795-1872), American journalist, originator and editor of the New York Herald, was by birth a Scotchman. Destined for the priesthood in the Roman Catholic church, he was educated in a seminary at Aberdeen. But it became evident that he was naturally unfit for the priestly calling. The reading of Franklin's Autobiography led him to emigrate to America in the spring of 1819. Landing at Halifax, he earned a poor living there for a short time by giving lessons in French, Spanish, and bookkeeping; he passed next to Boston, where starvation almost threatened him till he got employment in a printing office; and in 1822 he went to New York. An engagement as a translator of Spanish for a newspaper took him for a few months to Charleston, S. C. On his return to New York he projected a school, and did subordinate work for the journals. In 1825 he made his first attempt to establish a journal of his own, and the next ten years were occupied in a variety of similar attempts, which proved futile. During that period, however, he became Washington correspondent of the Inquirer; and his letters, written in imitation of the letters of Horace Walpole, attracted attention. Notwithstanding all his hard work and his resolutely abstemious life, he was still a poor man. In 1835 appeared the first number of a small one-cent paper, bearing the title of New York Herald, and issuing from a cellar, in which the proprietor and editor played also the part of salesman. By his immense industry and practical sagacity, variety of news, spicy correspondence, supply of personal gossip and scandal, the paper became a great commercial success. Bennett continued to edit the *Herald* till his death. The successful mission of Stanley to Central Africa in search of Dr. Livingstone, of whom nothing had long been heard, was undertaken by his desire and at his expense; and he thus showed in the last year of his life the inextinguishable spirit of enterprise which had animated him throughout his whole career.

Bennett, JAMES GORDON, JR.. son of the above, b. 1841; proprietor N. Y. *Herald*; at his father's death projected Stanley's expedition to Africa in search of Livingstone and the Jeanette polar expedition; associated with Mackay in Commercial Cable.

**Bennett**, WILLIAM STERNDALE (1816-1875), an English composer, b. at Sheffield, where his father was organist; became pupil of the Royal Academy in 1826, studying under Ciprani Potter, Crotch, and Lucas, and afterward Moscheles. He studied in Leipsic from 1836 to 1838. He was appointed professor of music at Cambridge in 1856, and was knighted in 1871.

**Ben-Ne'vis**, the most lofty mountain in Great Britain, in Inverness-shire. It rises to the height of 4,406 ft., and in clear weather yields a most extensive prospect. An observa-



tory was established on its summit in May, 1881, by the Scottish Meteorological Society.

Ben' nington, a town in Vermont where, on Aug. 16, 1777, General Stark at the head of 1,600 American militia was victorious over the British. Pop. 6.391.

**Benson**, EDWARD WHITE (1820–1896), archbishop of Canterbury, was b. in Birmingham, England, and took the highest classical honors at Cambridge in 1852. He was ordained priest in 1857, became headmaster of Wellington college in 1858, and was consecrated bishop of Truro, 1877. In December, 1882, he was consecrated archbishop. His son gained some fame as a society novelist.

**Bentham** (ben'tham), GEORGE (1800-1884), English botanist, nephew of Jeremy Bentham. He early attached himself to botany, and having resided in Southern France (where his father had an estate) in 1814-26 he published in French (1820) a work on the *Plants of the Pyrenees and Lower Languedoc.* Along with Sir J. D. Hooker he produced the great work of descriptive botany, *Genera Plantarum*; another great work of his was the *Flora Australiensis.* 

**Ben'tham, JEREMY** (1748-1832), the real founder of the Utilitarian school of philosophy, and an eminent writer on jurisprudence and legislation, was b. at London. He was educated at Westminster school, and Queen's college, Oxford, where he graduated at the age of sixteen. He studied at Lincoln's Inn for the bar at the request of his father. When a boy, he had been nicknamed the "philosopher," from his tendency to speculation, and he now devoted himself to the criticism of ethics and legislation. His first work, A Fragment of Government, which was an ingenious criticism of Blackstone's Commentaries, was published in 1776, and brought him into notice. It was followed by his Principles of Morals and Legislation in 1780; his Defense of Usury, in 1787; his Introduction to the Principles of Morals and Legislation in 1802: A Treatise on Judicial Evidence in 1813; and The Book of Fallacies in 1824.

Benton, THOMAS HART (1782-1858), American statesman, b. Hillsborough, N. C. His father, Col. Jesse Beuton, was a lawyer of North Carolina, and private secretary to Governor Tryon. He was partly educated at the university of North Carolina, but removed to Tennessee. Thomas studied law with St. George Tucker, was admitted to the bar of Nashville in 1811. In 1810 he entered the U. S. army, and was Jackson's aide-de-camp. Subsequently he had a quarrel with Andrew Jackson, which resulted in a personal combat with knives and pistols, and a long and bitter feud. He also raised a regiment of which he was appointed colonel, and when this was disbanded in 1813, he was made lieutenant-colonel by President Madison. In 1815 he moved to St. Louis, where he practised law and founded *The Missouri Inquirer*, a journal of strong proslavery proclivities. He advocated the ad-

it was included in the Union in 1820, he was chosen to the U.S. Senate, where he served for thirty years. He caused the adoption of a bill throwing the mineral and saline lands of Missouri open for occupancy; was an advocate of a railroad to the Pacific; favored the opening of trade with New Mexico; encouraged the establishment of military stations in Missouri: gave attention to post-roads, and, during the political agitation caused by President Jackson's determination to overthrow the U.S. Bank and to place the currency on a me-tallic basis, he advocated that measure, and received the name of "Old Bullion." He took an active part in the discussions in regard to the Oregon boundary, the annexation of Texas. and during the Mexican War he was useful to the government. He opposed Henry Clay's compromise measures in 1850, and his strug-gle against J. C. Calhoun's resolutions cost him his seat in the Senate. In 1852 he was elected to the House of Representatives, where he opposed the policy of President Pierce, and the Kansas-Nebraska bill, and in 1854 was defeated for Congress by a coalition of his former political opponents. He then retired from public life, and devoted himself to completing his Thirty Years' View, or a History of the Working of the American Government from 1820 to 1850. Gen. John C. Fremont married his daughter, Jessie.

**Ben'zine**, a liquid hydrocarbon obtained from coal-tar and petroleum. It may also be got by distilling 1 part of crystallized benzoic acid intimately mixed with 3 parts of slaked lime. It is quite colorless, of a peculiar, ethereal, agreeable odor, is used by manufacturers of india-rubber and gutta-percha, on account of its great solvent powers, in the preparation of varnishes, and for cleaning gloves, removing grease-spots from woolen and other cloths, etc., on account of its dissolving fats and resins. It is highly inflammable.

It is highly inflammable. Benzo'ic Acid, a vegetable acid obtained from benzoin and other resins and balsams, as those of Peru and Tolu. It forms light feathery needles; taste pungent and bitterish; odor slightly aromatic.

**Benzoic Ether**, a colorless, oily liquid, with a feeble aromatic smell and a pungent aromatic taste, obtained by distilling together 4 parts alcohol, 2 of crystallized benzoic acid, and 1 of concentrated hydrochloric acid.

**Ben'zoin**, a solid, brittle, vegetable substance, the concrete resinous juice flowing from incisions in the stem or branches of the *Styrax Benzoin*, a tree 70 or 80 feet high, nat. order Styracaceæ. In commerce several varieties are distinguished, of which the yellow, the Siam, the amygdaloidal—the last containing whitish tears of an almond shape—and Sumatra firsts are the finest. It is imported from Siam, Singapore, Bombay, and occasionally from Calcutta; it is found also in South America. The pure benzoin consists of two principal substances; viz., a resin, and an acid termed *benzoic*. It has little taste, but its smell is fragrant when rubbed or heated, and it is used as incense in the Greek and Roman Catholic

churches. It is insoluble in water, but soluble in alcohol, in which form it is used as a cosmetic and in pharmacy. Benzoin may be produced by the contact of alkalies with the commercial oil of bitter almonds. It is also known as benjamin, or gum benjamin.

Be owulf, an Anglo-Saxon epic poem, the only existing MS. of which belongs to the eighth or ninth century and is in the Cottonian Library (British Museum). It recounts the adventures of the hero Beowulf, especially his delivery of the Danish kingdom from the monster Grendel and his equally formidable mother, and, lastly, the slaughter by Beowulf of a fiery dragon, and his death from wounds received in the conflict. The character of the hero is attractive through its noble simplicity and disregard of self. The poem, the longest and most im portant in Anglo-Saxon literature, is in many points obscure, and the MS. imperfect.

**Béranger** (bā-rän-zhā), PIERRE JEAN DE (1780-1857), a famous French lyric poet. He applied in 1804 to Lucien Bonaparte for assistance, and succeeded in obtaining from him first, a pension of 1,000 francs, and five years later a university clerkship. Many of his songs became extremely popular, and in 1815 the first collection of them was published. A third collection appeared in 1825, and in 1828 a fourth, which subjected him to a state prosecution, an imprisonment of nine months, and a fine of 10,000 francs. In 1833 he published his fifth and last collections, thereafter remaining silent till his death. He died at Paris.

**Berar'**, otherwise known as the Hyderabad Assigned Districts, a province of India, in the Deccan, under the British resident at Hyderabad; area 17,717 sq. mi. The principal town is Ellichpore. Coal and iron ore are both found in the province, the pop. of which is 2,897,491.

in the province, the pop. of which is 2,897,491. **Berber**, a town of Egypt on the right bank of the Nile, about 20 miles below the confluence of the Atbara, a station for merchants on the route from Sennaar and Khartoum to Cairo, and also from Suakim. Pop. 8,000.



Ber bers, a people spread over nearly the whole of Northern Africa, from whom the name Barbary is derived. The chief branches into which the Berbers are divided are: first, the Amazirgh (or Amazigh), of Northern Morocco numbering from 2,000,000 t o 2,500,000. They are for

the most part quite independent of the Sultan of Morocco, and live partly under chief-

tains and hereditary princes and partly in small republican communities. Second, the Shuluh (Shillooh, or Shellakah), who number about 1,450,000 and inhabit the south of Morocco. They are more highly civilized than the Amazirgh. Third, the Kabyles in Algeria and Tunis, who are said to number 960,000 souls; and fourth, the Berbers of the Sahara, who inhabit the oases. The Berbers generally are about the middle height; their complexion is brown, and sometimes almost black, with brown and glossy hair. They are sparely built but robust and graceful; the features approach the European type. Their language has affinities to the Semitic group, but Arabic is spoken along the coast.

**Berbice** (ber-bes'), a district of British Guiana watered by the river Berbice. Area 750 sq. mi.; pop. 51,176. It contains the town of Berbice (or New Amsterdam), which has three churches and several public buildings. Pop. 8,903.

Berdiansk', a seaport of Southern Russia, gov. of Taurida, on the north shore of the Sea of Azof, with an important export and inland trade. Pop. 20,000.

Ber' ditchef, a city of European Russia, gov. of Kiev, with broad streets, well-built houses, numerous industrial establishments, and a very large trade, having largely attended fairs. Pop. 98,824, chiefly Jews.

**Berenice** (ber-e-nī'sē), the name of several distinguished women of antiquity; in particular the wife of Ptolemy Euergētes, king of Egypt. When her husband went to war in Syria she made a vow to devote her beautiful hair to the gods if he returned safe. She accordingly hung it in the temple of Venus, from which it disappeared, and was said to have been transferred to the skies as the constellation *Coma Berenices.* Also the wife of Mithridates the Great, king of Pontus, put to death by her husband (about 71 B. C.), lest she should fall into the hands of Lucullus.

Beresford, WILLIAM CHARLES DE LA POER, b. in Ireland, 1846. He entered the British navy and distinguished himself at the bombardment of Alexandria, 1882, and in the Khartoum expedition in 1885. He is a member of Parliament, and served a term at the Admiralty Board, but resigned in 1889 to accept a naval command.

**Berez'ina**, a tributary of the Dnieper, in the Russian province of Minsk, rendered famous by the disastrous passage of the French army under Napoleon during the retreat from Moscow, Nov. 27-20, 1812.

Ber' gama (ancient Pergamos), town, Turkey in Asia, n. of Smyrna: contains fine ruins of a Roman palace, etc. Pop. 16,070.

Ber'gamo, a town of North Italy, capital of the province of Bergamo (1,098 sq. mi, 419,599 inhabitants), consists of two parts, the old town situated on hills and having quite an ancient appearance, and the new town almost detached and on the plain. It trades largely in silk, silk goods, corn, etc., has the largest annual fair in North Italy, and extensive manufactures. Pop. 39, 129,

Ber'gamot, a fruit-tree, a variety or species of the genus Cürus, variously classed with the orange, the lime, or made a distinct species. It is probably of Eastern origin though now grown in Southern Europe, and bears a paleyellow pear-shaped fruit with a fragrant and slightly acid pulp. Its essential oil is in high esteem as a perfume. Bergamot is also a name given to a number of different pears.

Bergen (ber'gen), a seaport on the w. coast of Norway. The trade is large; timber, tar, train oil, cod-liver oil, hides, and particularly dried fish (stock-fish) being exported in return for corn, wine, brandy, coffee, cotton, woolens, and sugar. In 1445 a factory was established here by the Hanseatic cities of Germany. Pop. 53,684.

Bergen-op-zoom (ber'gen-op-zōm), a town, Holland, in a marshy situation on the Scheldt, 20 mi. n.n.w. of Antwerp. It was formerly of great strength, both from the morasses surrounding it and from its fortifications, and successfully resisted the attacks of the Duke of Parma in 1581 and 1588, and of Spinola in 1622, but was taken by the French in 1747 and 1794, and unsuccessfully attempted by the British in 1814. Pop. 12,478.

**Bergerac** (bārzh-rāk), town, France, department of the Dordogne. It has iron works, manufactures paper, hosiery, earthenware, liquors, etc., and gives its name to the wine of the Dordogne district, sometimes termed in France *petit champagne*. Pop. 14,735.

France petit champagne. Pop. 14,735. Bergh, HENRY (1823-1888), founder of the American Society for the Prevention of Cru-elty to Animals. After studying at Columbia college, he went to Europe, where he spent twelve years, and in 1862 was appointed secretary of the American legation in St. Petersburg. This position he resigned. In 1864 he returned to this country, and resolved to devote his time to the protection of animals. The first American society of the class was incorporated, with Mr. Bergh as its president, 1866. In the face of ridicule and opposition, Mr. Bergh created a reform recognized as one of the beneficent movements of the age. In 1886 thirty-nine states of the Union, Brazil, and the Argentine Republic had adopted the original laws procured for him by the legisla-ture of New York. Mr. Bergh received no salary for his services. He invented artificial pigeons for the sportsman's gun, and procured an ambulance for removing injured animals from the street. In 1874 he rescued a little girl from brutal treatment, which led to the founding of a Society for the Prevention of Cruelty to Children.

**Bergman** (ber $\hbar$ 'mån), TORBERN OLOF (1735-1784), a Swedish physicist and chemist. He studied under Linnæus at Upsala; in 1758 became Doctor of Philosophy and professor of physics there; and in 1767 became professor of chemistry. He succeeded in the preparation of artificial mineral waters, discovered the sulphureted hydrogen gas of mineral springs, and published a classification of minerals on the basis of their chemical character and crystalline forms. His theory of chemical affinities greatly influenced the subsequent development of chemistry.

Berhampur, the name of two Indian towns: 1, A town and military station in the n. e. portion of Madras presidency, the headquarters of Ganjám district, with a trade in sugar and manufactures of silk. Pop. 25,653. 2, A municipal town and the administrative headquarters of Murshidábád district, Bengal; formerly a military station, and having still larger barracks. It was the scene of the first overt act of mutiny in 1857. Pop. 22,515.

Ber'iberi, a disease endemic in parts of India, Ceylon, etc., characterized by paralysis, numbness, difficult breathing, and often other symptoms, attacking strangers, especially sailors, as well as natives, and generally fatal. Berkeley, Alameda co., Cal., a flourishing

Berkeley, Alameda co., Cal., a flourishing town, seat of State university and Agricultural college; also state institution for deaf, dumb, and blind. Pop. 1890, 5,101.

and blind. Pop. 1890, 5, 101. Berkeley (berk'li), DR. GEORGE (1685-1753), Bishop of Cloyne in Ireland, celebrated for his ideal theory. Became fellow of Trinity col-lege, Dublin, in 1707; went to England in 1713; traveled on the continent in 1714, and again in 1716-20. In 1721 he was appointed chaplain to the lord-lieutenant of Ireland, the Duke of Grafton. In 1724 he became dean of Derry. He now published his proposals for the conversion of the American savages to Christianity by the establishment of a college in the Bermuda Islands; and subscriptions having been raised, he set sail for Rhode Island in 1728, proposing to wait there till a promised grant of \$100,000 had been got from the government. Berkeley's philosophy maintains that the belief in the existence of an exterior material world is false and inconsistent with itself; that those things which are called sensible material objects are not external but exist in the mind and are merely impressions made on our minds by the immediate act of God, according to certain rules termed laws of nature, from which he never deviates; and that the steady adherence of the Supreme Spirit to these rules is what constitutes the reality of things to his creatures, and so effectually distinguishes the ideas perceived by sense from such as are the work of the mind itself or of dreams, that there is no more danger of confounding them together on this hypothesis than on that of the existence of matter. He is well-known for his verses wherein occurs the expression, "westward the course of empire takes its way."

Berkeley, SIR WILLIAM, colonial governor of Virginia. He was sent as governor to Virginia in 1641. When Cromwell attained to the control of the British government, Governor Berkeley offered an asylum in Virginia to loyalist gentlemen. He was compelled to resign. On the death of Samuel Mathews, the governor who had succeded him, Berkeley was temporarily elected governor, and received his commission from Charles II, after the restoration. Several harsh measures adopted by him caused considerable dissatisfaction among the colonists, particularly his faithlessness and obstinacy in dealing with Indians. In 1665 the king demanded his return; nevertheless Berkeley continued his authority in Virginia for eleven years longer. In 1675 he was prematurely recalled to England.

Berk' hamstead, Great, a town in England, Hertfordshire, with manufactures of strawplait and wooden ware. Birthplace of the poet Cowper, Pop. 5,034.

Berkshire (or Berks), a county of England, area 752 sq. mi. Few manufactures are carried on, the principal being agricultural implements and artificial manures, flour, paper, sacking and sail-cloth, and biscuits (at Reading). Malt is made in great quantities. The minerals are unimportant. Pop. 238,496.

Berlin', the largest town in Germany; capital of the Prussian dominions and of the German empire, in the province of Brandenburg, on a sandy plain on both sides of the Spree, here about 200 feet broad. The original portion of the city lies on the right bank of the river, and is irregularly built. The more modern portion is regular in its plan, and the streets are lined with lofty and well-built edifices mostly of white freestone, or brick covered with a coating of plaster or cement. Of the numerous bridges, the finest is the Castle (Schloss) Bridge, 104 feet wide, and having eight piers sur-mounted by colossal groups of sculpture in marble. The principal and most frequented street, Unter den Linden ("under the lime-trees") is about two thirds of a mile in learnth trees"), is about two thirds of a mile in length and 160 feet wide, the center being occupied by a double avenue of lime-trees. At the e. end of this street, and round the Lustgarten (a square with which it is connected by the Schloss Bridge) are clustered the principal public buildings of the city, such as the royal palace, the palace of the crown prince, the arsenal, the university, the museums, royal academy, etc.; while at the w. end is the Brandenburg Gate, regarded as one of the finest portals in existence. Immediately beyond this gate is the Thiergarten (zoological garden), an extensive and well-wooded park containing the palace of Bellevue and places of public amusement. There are also several other public parks. The principal public buildings are the royal palace or Schloss, a vast rectangular pile; the museum (opposite the Schloss), a fine Grecian building, with an extensive collection of sculpture and painting; the royal theater is also a fine Grecian edifice. The royal library and palace of the emperor are united; the former contains above 900.000 volumes and 15,500 manuscripts and charts. The arsenal, besides arms and artillery, contains flags and other trophies of great antiquity. The university, the exchange, the Italian opera house, the principal Jewish synagogue, the townhall, and the old architectural academy are all beautiful structures. The town contains altogether about twentyfive theaters, thirty hospitals, sixteen barracks, ten or twelve cemeteries, etc. The prevailing style of the newer buildings, both public and private, is Grecian, pure or Italianized. One of the most remarkable of modern monuments is that erected in 1851 to Frederick the Great

in the Unter den Linden - the chef d'œuvre of Rauch and his pupils. The literary institutions of the city are numerous and excellent they include the university, having an educational staff of nearly 260 professors and teachers, and attended by over 4,000 students, exclusive of 1,200 to 1,400 who do not matriculate; the academy of sciences; the academy of fine arts, and the technical high school or academy of architecture and industry (occupying a large new building in the suburb of Charlottenburg). The manufactures are various and extensive. including steam engines and other machinery, brass founding, and various articles of metal, sewing machines, paper, cigars, pottery and porcelain, pianos and harmoniums, artificial flowers, etc. In the royal iron foundry, busts, statues, bas-reliefs, etc., are cast, together with a great variety of ornaments of unrivaled delicacy of workmanship. The oldest parts of the city were originally poor villages, and first rose to some importance under Markgraf Albert (1206-20), yet about two centuries ago Berlin was still a place of little consequence, the first important improvement being made by the great Elector Frederick William, who planted the Unter den Linden, and in whose time it already numbered 20,000 inhabitants. Under his successors, Frederick I and Frederick the Great, the city was rapidly enlarged and improved, the population increasing fivefold in the hundred years preceding the death of Frederick the Great and tenfold in the century succeeding it. Pop. 1,578,794.

Treaty of Berlin, the treaty signed July 13, 1878, at the close of the Berlin Congress, which was constituted by the representatives of the six great powers and Turkey. The treaty of San Stefano previously concluded between Turkey and Russia was modified by the Berlin treaty, which resulted in the division of Bulgaria into two parts, Bulgaria proper and Eastern Roumelia, the cession of parts of Armenia to Russia and Persia, the independence of Roumania, Servia, and Montenegro, the transference of Bosnia and Herzegovina to Austrian administration, and the retrocession of Bessarabea to Russia. Greece was also to have an accession of territory. By a separate arrangement previously made between Britain and Turkey the former got Cyprus to administer.

Berlin, Green Lake co., Wis., on Fox River, 97 mi. n. w. of Milwaukee. Railroad: C. M. & St. P. Industries: shoe co., one feed mill, two iron foundries, two wagon factories, and others. First settled in 1848 by Nathan Strong, and called "Strong's Landing." Became a city in 1857. Pop. est. 1897, 4,400.

Berlin', a town of Canada, prov. Ontario, about 60 mi. w. s. w. of Toronto, with some manufactures. Pop. 7,425. Berlin Spirit, a coarse spirit distilled from

potatoes, beets, etc.

Berlioz (ber-li-os), HECTOR (1803-1869), a French composer, the leader of the Romantic school of music in his native country. He forsook medicine to study music at the Paris Conservatoire, where he gained the first prize in 1830 with his cantata Sardanapale. As critic of the Journal des Debats and feuilletonist he displayed scarcely less originality than in his music. His musical works belong to the Romantic school, and are specially noteworthy for the resource they display in orchestral coloring.

Ber' mondsey, a parish near and part of London, England, on the Surrey side of the Thames, between Southwark and Rotherhithe. Large tan yards and wharfs. Pop. 64,682.

**Bermu'da Grass**, a grass cultivated in the West Indies, U. S., etc., a valuable fodder grass in warm climates.

**Bermu'das** (or Somers Islands), a cluster of small islands in the Atlantic Ocean belonging to Britain; area 20 sq. mi. They were first discovered by Juan Bermudez, a Spaniard, in 1522; in 1609 Sir George Somers, an Englishman, was wrecked here, and, after his shipwreck, formed the first settlement. The most considerable are St. George, Bermuda or Long Island (with the chief town Hamilton, the seat of the governor), Somerset, St. David's, and Ireland. They form an important British naval and military station. An immense iron floating dock, capable of receiving a vessel of 3,000 tons, was towed from London to the Bermudas in 1868. The climate is generally healthy and delightful, but they have been sometimes visited by yellow fever. Numbers of persons from the U. S. and Canada now pass the colder months of the year in these islands. Pop. 16,000.

Bern, a town in Switzerland, capital of the canton Bern, and, since 1848, of the whole Swiss Confederation. Among the public buildings are the great Gothic cathedral, built between 1421 and 1502; the church of the Holy Spirit; the federal-council buildings (or parliament house), commanding a splendid view of the Alps: the university, the town house, a Gothic edifice of the fifteenth century; the mint; etc. Bern has an academy and several literary societies, and an excellent public library. Manufactures: woolens, linens, silk stuffs, stockings, watches, clocks, toys, etc. Bern became a free city of the empire in 1218. In 1353 it entered the Swiss Confederacy. Pop. 47,620. The canton of Bern has an area of 2,657 sq. mi. Of the surface over 58 per cent. is under cultivation or pasture. Agriculture and cattle-rearing are the chief occupations; manufactures embrace linen, cotton, silk, iron, watches, glass, pottery, etc. Bienne and Thun

are the chief towns after Bern. Pop. 536,670. Bernadotte (ber-nå-dot) (1764-1844), JEAN BAFTISTE JULES, a French general, afterward raised to the Swedish throne, was the son of an advocate of Pau. He enlisted at seventeen, became sergeant major in 1789, and subaltern in 1790. In 1794 he was appointed a general of division, and distinguished himself greatly in the campaign in Germany, and on the Rhine. In 1798 he married Mademoiselle Clary, sister-in-law of Joseph Bonaparte. The following year he became for a short time minister of war, and on the establishment of the empire was raised to the dignity of marshal of France, and the title of Prince of Ponte-Corvo. On the death of the Prince of Holstein-Augustenburg the heir apparency to the Swedish crown was offered to the Prince of Ponte-Corvo, who accepted with the consent of the emperor, went to Sweden, abjured Catholicism, and took the title of Prince Charles John. In the maintenance of the interests of Sweden a serious rupture occurred between him and Bonaparte, followed by his accession in 1812 to the coalition of sovereigns against Napoleon. At the battle of Leipsic he contributed effectually to the victory of the At the close of the war strenuous allies. attempts were made by the Emperor of Austria and other sovereigns to restore the family of Gustavus IV to the crown; but Bernadotte. retaining his position as crown prince, became king of Sweden on the death of Charles XIII in 1818, under the title of Charles XIV. During his reign agriculture and commerce made great advances, and many important public works were completed. He was succeeded by his son Oscar.

Ber nard, GREAT ST., a celebrated Alpine pass in Switzerland, canton Valais, on the mountain road leading from Martigny in Switzerland to Aosta in Piedmont, and rising to a height of 8.150 ft. Almost on the very crest of the pass, near a small lake on which ice sometimes remains throughout the year, is the famous hospice, next to Etna observatory the highest inhabited spot in Europe. The hospice was founded in 962 by St. Bernard of Menthon, an Italian ecclesiastic, for the benefit of pilgrims to Rome. In May, 1800, Napoleon led an army of 30,000 men, with its artillery and cavalry, into Italy by this pass.

Bernard, LITTLE ST., a mountain, Italy, belonging to the Graian Alps, about 10 mi. s. of Mont Blanc. The pass across it, one of the easiest in the Alps, is supposed to be that which Hannibal used. Elevation of hospice, 7,192 ft.

Ber' nard, SAINT, of Clairvaux (1091-1153), one of the most influential ecclesiastics of the Middle Ages, b. at Fontaines, Burgundy. In 1113 he became a monk at Citeaux; in 1115 first abbot of Clairvaux, the great Cistercian monastery near Langres. In 1140 he secured the condemnation of Abelard for heresy. Seventy-two monasteries owed their foundation or enlargement to him; and he left no fewer than 440 epistles, 340 sermons, and 12 theological and moral treatises. He was canonized in 1174.

**Bernburg** (bern'burk), a town, Germany, duchy of Anhalt, on both sides of the Saale, divided into the old, the new, and the high town; the first two communicating by a bridge with the latter. It contains an oil mill, breweries, distilleries; and manufactures paper, earthenware, copper and tinwares, etc. Pop. 28,326.

Bernese Alps, the portion of the Alps which forms the northern side of the Rhone Valley, and extends from the Lake of Geneva to that of Brienz, comprising the Finsteraarhorn. Schreckhorn, Jungfrau, Monk, etc.

Bernhardt (ber-när), ROSINE SARA, a French actress, born at Paris 1844. Of Jewish descent, her father French. her mother Dutch, her

early life was spent largely in Amsterdam. In 1858 she entered the Paris Conservatoire and gained prizes for tragedy and comedy in 1861 and 1862; but her debut at the Théâtre Français in Iphigénie and Scribe's Valérie was not a success. After a brief retirement she reappeared at the Gymnase and the Porte Saint-Martin in burlesque, and in 1867 at the Odćon in higher drama. Her success in Hugo's Ruy Blas led to her being recalled to the Théatre Français, since which she has abundantly proved her dramatic genius. In 1879 she visited London, and again in 1880, about which time she severed connection with the Comédie Française under heavy penalty. In 1882 she married M. Damala, a Greek, from whom she was shortly afterward divorced. Her tours both in Europe and America have never failed to be successful.

**Bernina** (ber-nē'nā), a mountain in the Rhætian Alps, 13,000 ft. high, with the large Morteratsch Glacier. The Bernina Pass on the west of the mountain is 7,695 ft. in height.

Bernouilli (or Bernoulli) (ber-nö-yō), a family which produced eight distinguished men of science. The family fled from Antwerp during the Alva administration, going first to Frankfort, and afterwards to Bale. Of these JAMES, b. at Bâle 1654, became professor of mathematics there 1687, and d. 1705. He applied the differential calculus to difficult questions of geometry and mechanics; calculated the loxodromic and catenary curve, the logarithmetic spirals, the evolutes of several curved lines, and discovered the so-called numbers of Bernouilli. JOHN, b. at Bale 1667, wrote with his brother James a treatise on the differential calculus; developed the integral calculus, and discovered, independently of Leibnitz. the exponential calculus. In 1694 he became doctor of medicine at Båle, and in 1695 went, as professor of mathematics, to Groningen. After the death of his brother in 1705 he received the professorship of mathematics at Bâle, which he held until his death in 1748.

Bern'storff, the name of a German noble family, of whom the most distinguished was JOHANN HARTWIG ERNST (1712-1772), Count von-Bernstorff, Danish statesman under Frederick V. and Christian VII. He was the most influential member of the government, which distinguished itself under his direction by a wise neutrality during the Seven Years' War, etc., by measures for improving the condition of Danish peasantry; by promoting science, and sending to Asia the expedition which Neibuhr accompanied. By his efforts Denmark acquired Holstein.

**Berri** (or Berry), formerly a province and dukedom, with Bourges as capital, almost in the center of France. It is now mainly comprised in the departments Indre and Cher. It gave the title of Duke to a noted French soldier (1778-1820).

Berry, a succulent fruit, in which the seeds are immersed in a pulpy mass inclosed by a thin skin. The name is usually given to fruits in which the calyx is adherent to the ovary and the placentas are parietal, the seeds finally separating from the placenta and lying loose in the pulp. The term, however, is frequently used to include fruits in which the ovary is free and the placentas central, as the grape. Popularly it is applied to fruits like the strawberry, bearing external seeds on a pulpy receptacle, but not strictly berries.

**Bersaglieri** (ber-sål-yā'rē), a corps of Italian sharpshooters organized early in the reign of Victor Emmanuel by General Alessandro della Marmora. Two battalions took part in the Crimean War and distinguished themselves at the battle of Tchernaya (Aug. 16, 1855). They are the "show" soldiers of the Italian army, and at reviews execute all movements, like the Zouaves, at a sharp run.

Berthler (bert-yā), ALEXANDER (1753-1815), prince of Neuchätel and Wagram, marshal, vice-constable of France, etc. While yet young he served in America with Lafayette, and after some years' service in France he joined the army of Italy in 1795 as general of division and chief of the general staff, receiving in 1798 the chief command. In this capacity he entered Rome, abducted Pius VI, abolished the papal government, and established a consular one. He followed Bonaparte to Egypt as chief of the general staff; was appointed by him minister of war after the 18th Brumaire; accompanied him to Italy in 1800, and again in 1805, to be present at his coronation; and was appointed chief of the general staff of the grand army in Germany. After Napoleon's abdication he was taken into the favor and confidence of Louis XVIII.

**Berthollet** (ber-to-lä), CLAUDE LOUIS, Count (1748–1822), an eminent French chemist. His chief chemical discoveries were connected with the analysis of ammonia, the use of chlorine in bleaching, the artificial production of nitre, etc.

Berwick (ber'ik) (or more fully Berwick-on-Tweed), a seaport town of England, on the Scottish border. Chief industries: iron-founding, the manufacture of engines and boilers, agricultural implements, feeding-cake, manures, ropes, twine, etc.; there is a small shipping trade. In the beginning of the twelfth century, during the reign of Alexander I, Berwick was part of Scotland, and the capital of the district called Lothian. In 1216 the town and castle were stormed and taken by King John; Bruce retook them in 1318; but, after undergoing various sieges and vicissitudes. both were surrendered to Edward IV in 1482. and have ever since remained in possession of England. Pop. 13,929. The county of Berwick, the most eastern border county of Scotland, is divided into the three districts of Lauderdale (the valley of the Leader). Lammermoor, and the Merse, or March (the valley of the Tweed). Total area 464 sq. mi.; pop. 32,406. The minerals are unimportant, though freestone and marl are abundant. The county is in high repute for agriculture, but has few manufactures, the principal being paper. The county town is Greenlaw.

**Ber'yl**, a colorless, yellowish, bluish, or less brilliant green variety of emerald, the pre-

# Berzelius

vailing hue being green of various shades, but always pale, the want of color being due to absence of chromium, which gives to the em-



Beryl, in its primary form.

best beryls are found in Brazil, in Siberia, and Ceylon, and in Dauria, on the frontiers of China. Beryls are also found in many parts of the U.S. Some of the finer and transparent varieties of it are often called aquamarine.

structure

The

Berze' Hus, John James, Baron (1779-1848), Swedish chemist; studied medicine at Upsala, and was appointed lecturer in chemistry in the Stockholm military academy in 1806, and the following year professor of pharmacy and medicine. He discovered selenium and thorium, first exhibited calcium, barium, strontium, tantalum, siliciun, and zirconium in the elemental state, and investigated whole classes of compounds, as those of fluoric acid, the metals in the ores of platinum, tantalum, molybdenum, vanadium, sulphur salts, etc., and introduced a new nomenclature and classification of chemical compounds. His writings comprise an important Text-book of Chemistry.

Besançon (bé-sán-sõn), a town of Eastern France, capital of the dept. Doubs, surmounted by a strong citadel. It is further strengthened by a system of forts on neighbor-ing eminences. The manufactures comprise linen, cotton, woolen, and silk goods, ironmongery, etc.; but the principal industry is watchmaking, which employs about 13,000 persons. Besançon is the ancient Vesontio, Besontium, or Bisontium described by Caesar. In the fifth century it came into possession of the Burgundians; in the twelfth passed with Franche-Comté to the German empire. In 1679 it was ceded to France along with the rest of the Franche-Comté, of which it remained the capital till 1793, with a parliament, etc., of its own. Pop. 56,055.

Besant', ANNIE, English theosophist; is the divorced wife of the Rev. F. Besant, of Sibsey, Lincolnshire. She was for years the associate of Bradlaugh and then embraced theosophy and Madame Blavatsky.

Besant', WALTER, English novelist, b. 1838. He is best known by his novels, a number of which were written in partnership with the late Mr. James Rice, including Ready-Money, Mortiboy; This Son of Vulcan; The Case of Mr. Lucraft; The Golden Butterfly; The Monks of Thelema; etc. Since Mr. Rice's death (1882) he has written All Sorts and Conditions of Men; All in a Garden Fair; Dorothy Foster; The World Went very Well Then; etc.

# **Bessemer Steel**

Bessara 'bia, a Russian province between the Pruth and Danube and the Dniester. It was conquered by the Turks 1474, taken by the Russians 1770, ceded to them by peace of Bucharest in 1812; the s. e. extremity was given to Turkey in 1856, but restored to Russia by treaty of Berlin, 1878, in exchange for the Dobrudsha. It is fertile in grain, but is largely used for pasturage. Capital, Kishenef. Area 17,619 sq. mi.; pop., chiefly Wallachians, Gyp-sies, and Tartars, 1,723,450.

Bes'sel, FRIEDRICH WILHELM (1784-1846), a German astronomer appointed in 1810 director of the observatory at Königsberg. In 1840 he called attention to the probable existence of a planetary mass beyond Uranus, resulting in the discovery of Neptune.

Bessemer, Jefferson co., Ala., on Valley Creek, 13 miles s. w. of Birmingham. Rail-roads: Ala. Gt. Southern; L. & N.; Georgia Pacific; K. C. M. & B.; Southern; Bessemer & Birmingham; Birmingham, Powderly & Bessemer. Industries: two iron foundries, flour mill, coke ovens, etc. Surrounding country agricultural and mineral. It is the sixth city in taxable values, and the seventh in population, in Alabama. The town b in 1888. Pop. est. 1897, at 6,500. The town became a city

Bessemer, HENRY, an English engineer and inventor, was b. in Hertfordshire in 1813, and is chiefly known in connection with the celebrated process for making steel which bears his name— a process which has effected an entire revolution in the steel trade. This important invention is described in the following article. B. has distinguished himself by many other inventions and scientific improvements.\_ In 1875 considerable attention was attracted by what was known as the B.-saloon steamer, which was designed to counteract the unpleasant motion of the sea by means of a swinging cabin, to be kept in position by an ingenious arrangement of machinery. But after several experiments in the English Channel with a large steamer built for the purpose, the inven-tion has apparently failed. In 1871 B. was appointed president of the Iron and Steel Institute, and in 1879 received the honor of knighthood.

Bess'emer Steel is steel made direct from pig iron by a process patented in 1855, and subsequently, by Henry B. This process, as now worked. is briefly as follows: The pig iron is remelted in a cupola, and poured into a large vessel called & converter, lined with fire brick and capable of revolving upon horizontal trunnions. The converter is then turned up, and air at a high pressure is blown upward through the liquid metal. Most of the silicon is first burnt out, a dull flame appearing at the mouth of the converter; presently the carbon begins to burn (combining with the oxygen of the blast), and the flame increases to a dense, white, roaring blaze, accompanied by most violent ebullition. This continues until the decarburization is complete, when the flame suddenly contracts. The converter is then turned down, and a measured quantity (about 6 or 8 per cent.) of spiegeleisen (iron containing

## Betel

about 10 per cent. of manganese) is run into it. This is sufficient to add the required amount of carbon for the steel, and after the occur-



Bessemer Converting Vessel.

rence of a further short "flaming reaction," the liquid steel is run out into ladles, and thence into molds.

The use of *spicgeleisen* was patented by Robert Mushet in 1856, but the patent was subsequently allowed to lapse. It is, however, of the greatest importance in the B. process, not only for the reason mentioned, but also because the manganese combines with the oxygen left in the iron by the passage through it of such a large body of air, which would otherwise have a most deleterious effect on the quality of the steel produced.

In Sweden and Germany, where manganiferous ores are frequently used, the decarburizing of the liquid metal is generally stopped short at the required point, and the steel run off; the exact instant at which the point for turning down the converter is reached being determined by the spectroscope. This beautiful application of the principles of spectrum analysis is due to Sir Henry E. Roscoe. The remelting of the pig in a cupola is also frequently dispensed with abroad.

Bet'el (bet'le), a species of pepper, a creeping or climbing plant, native of the East Indies. The leaves are employed to enclose a piece of the areca or betel nut and a little lime into a pellet, which is extensively chewed in the East. The pellet is hot and acrid, but has aromatic and astringent properties. It tinges the saliva, gums, and lips a brick-red, and blackens the teeth,

Betel nut, the kernel of the fruit of a beautiful palm, found in India and the East, and named from being chewed along with betel leaf. When ripe it is of the size of a cherry, conical in shape, brown externally, and mottled internally like a nutmeg. Ceylon alone exports 70,000 cwt. annually.

Beth'any (now called El'Azariyeh or Lazarieh), a village of Palestine at the base of Mount Olivet, about two mi. e. of Jerusalem, formerly the home of Martha, Mary, and Lazarus, and the place near which the ascension of our Lord took place.

**Bethes' da** ("house of mercy"), a pool in Jerusalem near St. Stephen's Gate and the Temple of Omar. It is 400 ft. long, 130 broad, and 75 deep, and now known as Birket Israel. See John 5: 2-9.

Beth'lehem, the birthplace of Christ; a village, formerly a town in Palestine, a few miles south from Jerusalem. Pop. about 3,000, chiefly Christians, who make rosaries, crucifixes, etc., for pilgrims. There are three convents for Catholics, Greeks, and Armenians. A richly adorned grotto lighted with silver and crystal lamps, under the choir of the fine church built by Justinian, is shown at the actual spot where Jesus was born.

Bethlehem, a town of Pennsylvania founded by Moravians in 1741, on the Lehigh, across which is a bridge connecting it with South Bethlehem, the seat of Lehigh University. Pop. 6,762. The vast Bethlehem iron works here produce armor plate and guns for the American navy and coast defense service.

**Bel'tis** (or Bitlis), a town, Turkish Armenia, not far from Lake Van, one of the most ancient cities of Kurdistan. Pop. (Turks, Kurds, and Armenians) from 5,000 to 10,000.

**Beust** (boist), FRIEDRICH FERDINAND, Count von (1809–1886), Saxon and Austrian statesman. He adopted the career of diplomacy, and as a member of embassies or ambassador for Saxony resided at Berlin, Paris, Munich, and London.



Betel vine.

He lent his influence on the side of Austria against Prussia before the war of 1866, after which, finding his position in Saxony difficult, he entered the service of Austria as minister



of foreign affairs, became president of the ministry, imperial chancellor, and in 1868 was created count. In 1871-78 he was ambassador in London, in 1878-82 in Paris.

**Beuthen** (boi'tn), a town in Prussian Silesia near the s.e. frontier, in the government of Oppeln; the center of a mining district. Manufactures of cloth and linens. Pop. 22,811.

**Beveland** (bē've-lånt), North and South, two islands in the estuary of the Scheldt. Netherlands, province of Zealand; area of North Beveland, 18 sq. mi., pop. 6,000; area of South Beveland, 25 sq. mi., pop. 23,000; chief town, Goes, 5,000. It is very fertile, and has manufactures of salt, leather, beer, etc.

Bev'erley, town of England, East Riding of Yorkshire, 10 mi. n.n.w. of Hull, and 1 from the river Hull, with which it has canal connection: has a fine Gothic minster, completed in the reign of Henry III, and in some regards unsurpassed. Pop. 12,539.

**Beverly**, Mass., about 18 mi. n.e. of Boston; a fine harbor, various manufactures. Pop. 1890, 10,821.

Bewick (bū'ik), THOMAS (1753-1828), a celebrated English wood engraver. He executed the woodcuts for Hutton's Mensuration. In 1775 he received the Society of Arts prize for the best wood engraving. He became known as a skilled wood engraver and designer by his illustrations to Gay's Fables, Æsop's Fables, etc. He quite established his fame by the issue of his History of Quadrupeds. Among his other works may be cited the engravings for Goldsmith's Trareler and Deserted Village, Parnell's Hermit, and Somerville's Chase.

**Beyrout** (bIröt') (or Beirut; ancient Berytus), the chief seaport of Syria, pashalic of Acre, 60 mi. n.w. of Damascus; pop. 83,729, mostly Christians. Its chief exports are, olive oil, cereals, sesame, tobacco, and wool; its manufactures are silk and cotton. In ancient times Beyrout was a large and important Phœnician city. The Byzantine emperor Theodosius II raised it to the rank of a metropolis, and it again rose to importance during the Crusades. In later times it was long in the possession of the Druses. It was bombarded and taken by the British in 1840.

Be'za (properly, de Beze), THEODORE (1519-1605), next to Calvin the most distinguished man in the early reformed church of Geneva; born of a noble family at Vezelay, Burgundy, educated in Orleans under Melchior Volmar, a German scholar devoted to the Reformation; in 1539 became a licentiate of law, and went to reside at Paris. In 1549 he became professor of Greek at Lausanne. He rendered service to the cause of the reformers at the court of the king of Navarre and in attendance upon Condé and Coligny. In 1564 the administration of the Genevese church fell entirely to his care. Among his many works, his History of Caltin-ism in France from 1521 to 1563, and Theological Treatises, are still esteemed; but he is most famous for his Latin translation of the New Testament.

**Béziers** (bā-zyār), a town in Southern France, dep. Hérault, beautifully situated on a

height and surrounded by old walls, its chief edifices being the cathedral, a Gothic structure crowning the height on which the town stands, and the old episcopal palace, now used for public offices; manufactures: woolens, hosiery liquors, chemicals, etc., with a good trade in spirits, wool, grain, oil, verdigris, and fruits. In 1209 Béziers was the scene of a horrible massacre of the Albigenses. Pop. 45,475.

Be zoar, a concretion or calculus, of a roundish or ovate form, met with in the stomach or intestines of certain animals, especially ruminants. Nine varieties of bezoars have been enumerated, broadly divisible into those which consist mainly of mineral and those which consist of organic matter. The true oriental bezoars, obtained from the gazelle, belong to the second class. They are formed by accretion round some foreign substance, a bit of wood, straw, hair, etc., and were formerly regarded as efficacious in preventing infection and the effects of poison.

**Bhagalpur** (bhü-gal-pör), a city in Bengal, capital of a district of the same name. There are several indigo works in the neighborhood. Pop. 69,106. The district of Bhagalpur has an area of 4,327 sq. mi. and a pop. (chiefly Hindus and Mohammedans) of 2,032,696.

**Bhagavad-Gita**, a philosophical Sanscrit poem supposed to belong to the first century before Christ, which containing some didactic and philosophical doctrines, is read in the English translation by the theosophists.

**Bhamo**, a town of Burmah on the Upper Irrawaddy, about 40 mi. from the Chinese frontier. It is the starting point of caravans to Yunnan, and is in position to become one of the great emporiums of the east in event of a regular overland trade being established between India and West China. Pop. 8,018.

Bhang. See Hashish.

**Bhar'trihari**, Indian poet, reputed author of a book of apophthegms, according to legend a dissolute brother of King Vikramáditya (first century B. C.), who became a hermit and ascetic. The collection of 300 apophthegms bearing his name is, however, probably an anthology; 200 of them were translated into English and published at Nürnberg by Abraham Roger as early as 1653, the first Indian writings known in Europe.

Bheels (or Bhils), a Dravidic race inhabiting the Vindhya, Satpura, and Satmala Hills, a relic of the Indian aborigines driven from the plains by the Aryan Rajputs. They appear to have been orderly and industrious un-der the Delhi emperors; but on the transfer of the power in the eighteenth century from the Moguls to the Marathas they asserted their independence, and being treated as outlaws took to the hills. Various attempts to subdue them were made by the Gaekwar and by the British in 1818 without success. A body of them was, however, subsequently reclaimed and a Bheel corps formed, which stormed the retreats of the rest of the race and reduced them to comparative order. The hill Bheels wear little clothing, and live precariously on grain, wild roots, and fruits, vermin, etc., but

the lowland Beels are in many respects Hinduized. Their total numbers are about 750,000.

**Bhopal** (bho-päl'), a native state of Central India under British protection, on the Nerbudda, in Malwah. Area 6,784 sq. mi. Chief exports: sugar, tobacco. ginger, and cotton. Pop. 952,486. The capital of above state, also called Bhopal, is on the boundary between Malwah and Gundwana. Pop. 55,402.

**Bhurtpore'** (or Bhartpur'), a native state, India, in Rajputána. Area 1,982 sq. mi. Chief productions: corn, cotton, and sugar. Under British protection since 1826. Pop. 640,303. The capital, which has the same name, is a fortified place, and was formerly of great strength, Lord Lake being compelled to raise the siege in 1805 after losing 3,100 men. It was taken by Lord Combermere in 1827. Pop. 66,163.

Bhutan (bhu-tān'), an independent state of India, in the Eastern Himalayas, with an area of about 10,000 sq. mi. Pop. 20,000 or 30,000.

**Biaf'ra**, Bight of, an African bay running in from the Gulf of Guinea, having the Cameroon Mountains at its inner angle, and containing the island of Fernando Po.

**Blar' ritz**, a small seaport, France, Besses-Pyrénées, near Bayonne. It became a fashionable watering place during the reign of Napoleon III, who had an autumn residence there. Pop. 9,117.

**Bi'as,** one of the seven sages of Greece, b. at Priene, in Ionia; flourished about 570 B. C. He appears to have been in repute as a political and legal adviser, and many sayings of practical wisdom attributed to him are preserved by Diogenes Laertius.

Bible (Greek biblia, books, from biblos, the inner bark of the papyrus, on which the ancients wrote), the collection of the Sacred Writings or Holy Scriptures of the Christians. Its two main divisions, one received by both Jews and Christians, the other by Christians only, are improperly termed Testaments, owing to the confusion of two meanings of the Greek work diatheke, which was applied indifferently to a covenant and to a last will or testament. The Jewish religion being represented as a compact between God and the Jews, the Christian religion was regarded as a new compact between God and the human race; and the Bible is, therefore, properly divisible into the Writings of the Old and New Covenants. The books of the Old Testament received by the Jews were divided by them into three classes: 1, The Law, con-tained in the Pentateuch or five books of Moses. 2, The Prophets, comprising Joshua, Judges, 1 and 2 Samuel, 1 and 2 Kings, Isaiah, Jeremiah, Ezekiel, and the twelve minor prophets. 3, The Ketubim (or Hagiographa) (holy writings) containing the Psalms, Proverbs, Job, in one division: Ruth, Lamentations, Ecclesiastes, Esther, the Song of Solomon, in another division; Daniel, Ezra, Nehe-miah, 1 and 2 Chronicles, in a third. These books are extant in the Hebrew language; others, rejected from the canon as apocryphal by Protestants, found only in Greek or Latin.

The books of Moses were deposited, according to the Bible, in the tabernacle, near the ark, the other sacred writings being similarly preserved. They were removed by Solomon to the temple, and on the capture of Jerusalem by Nebuchadnezzar probably perished. Ac-cording to Jewish tradition Ezra, with the assistance of the great synagogue, collected and compared as many copies as could be found, and from this collation an edition of the whole was prepared, with the exception of the writings of Ezra, Malachi, and Nehemiah, added subsequently, and certain obviously later insertions in other books. When Judas Maccabæus repaired the temple, which had been destroyed by Antiochus Epiphanes, he placed in it a correct copy of the Hebrew Scriptures, whether the recension of Ezra or not is not known. This copy was carried to Rome by Titus. The exact date of the determination of the Hebrew canon is uncertain, but no work known to be written later than about 100 years after the captivity was ad-mitted into it by the Jews of Palestine. The Hellenistic or Alexandrian Jews, however, were less strict, and admitted many later writings, forming what is now known as the Apocrypha, in which they were followed by the Latin Church. The Protestant churches at the reformation gave in their adherence to the restricted Hebrew canon, though the apocrypha was long included in the various editions of the Bible. The division into chapters and verses, as it now exists, is of comparatively modern origin, though divisions of some kind were early introduced. Cardinal Hugo de Sancto Caro, in the thirteenth century, divided the Latin translation known as the Vulgate into chapters for convenience of reference, and similar divisions were made in the Hebrew text by the Rabbi Mordecai Nathan in the fifteenth century. About the middle of the sixteenth century the verses in Robert Stephanus's edition of the Vulgate were for the first time marked by numbers.

The earliest and most famous version of the Old Testament is the Septuagint, or Greek translation, executed by Alexandrian Greeks. and completed probably before 130 B. C., different portions being done at different times. This version was adopted by the early Christian church and by the Jews themselves, and has always held an important place in regard to the interpretation and history of the Bible. The Syriac version, the Peshito, made early in the second century after Christ, is celebrated for its fidelity. The Coptic version was made from the Septuagint in the third or fourth The Gothic version, by Ulphilas. century. was made from the Septuagint in the fourth century, but mere insignificant fragments of it are extant. The most important Latin version is the Vulgate, executed by Jerome, partly on the basis of the original Hebrew, and completed in 405 A. D.

The printed editions of the Hebrew Bible are very numerous. The first edition of the entire Hebrew Bible was printed at Soncino in 1488. The Brescian edition of 1494 was used

19

by Luther in making his German translation. The editions of Athias (1661 and 1667) are much esteemed for their beauty and correctness. Van der Hooght followed the latter. Doctor Kennicott did more than any one of his predecessors to settle the Hebrew text. His Hebrew Bible appeared at Oxford in 1776-80, two vols. folio. The text is from that of Van der Hooght, with which 630 MSS. were collated. De Rossi, who published a supplement to Kennicott's edition (Parma, 1784-99, five vols. 4to), collated 958 MSS. The German Orientalists, Gesenius, De Wette, etc., in recent times, have done very much toward correcting the Hebrew text. The oldest MS. of the Hebrew Bible belongs to 1106, and presents what is known as the Massoretic text; that is, the text provided with the vowel points and other markings which were inserted by Jewish scholars known as the Massoretes.

The books of the New Testament were all written in Greek, unless it be true, as some critics suppose, that the gospel of St. Matthew was originally written in Hebrew. Most of these writings have always been received as canonical; but the Epistle to the Hebrews, commonly ascribed to St. Paul, that of St. Jude, the second of Peter, the second and third of John, and the Apocalypse, have been doubted. The three oldest MSS. are: 1, the Sinaitic MS., discovered by Tischendorf in a convent on Mount Sinai in 1859, assigned to the middle of the fourth century; 2, the Vatican MS. at Rome, of similar date; 3, the Alexandrine MS. in the British Museum, assigned to the middle of the fifth century. Each MS. contains also the Septuagint Greek of the Old Testament in great part. The Vulgate of Jerome embraces a Latin translation of the New as well as of the Old\_Testament, based on an older Latin version. The division of the text of the New Testament into chapters and verses was introduced later than that of the Old Testament; but it is not precisely known when or by whom. The Greek text was first printed in the Complutensian Polyglot, in 1514; in 1516 an edition of it was published at Basel by Erasmus. Among recent valuable editions are those of Lachmann, Tischendorf, Tregelles, and Westcott and Hort.

Of translations of the Bible into modern languages the English and the German are the most celebrated. Considerable portions were translated into Anglo-Saxon, including the Gospels and the Psalter. Wycliffe's translation of the whole Bible (from the Vulgate), begun about 1356, was completed shortly be-**T**he fore his death, which took place in 1384. first printed version of the Bible in English was the translation of William Tindall (or Tyndale), whose New Testament was printed in quarto at Cologne in 1525, a small octavo edition appearing at the same time at Worms. Tonstall, bishop of London, caused the first edition to be bought up and burned. The Pentateuch was published by Tindall in 1530, and he also translated some of the prophetical books. Our translation of the New Testament is much in-

debted to Tindall's. A translation of the entire Bible was published by Miles Coverdale in 1535. It was undertaken at the instance of Thomas Cromwell, and being made from German and Latin versions was inferior to Tindall's. After the death of Tindall, John Rogers undertook the completion of his translation and the prepa-ration of a new edition. In this edition the latter part of the Old Testament (after 2 Chronicles) was based on Coverdale's version. A revised edition was published in 1539 under the superintendence of Richard Taverner. In the same year as Taverner's, another edition appeared, printed by authority, with a preface by Cranmer, and hence called Cranmer's Bible. This was the first Bible printed by authority in England, and a royal proclamation in 1540 ordered it to be placed in every parish church. This continued, with various revisions, to be the authorized version till 1568. In 1557-60 an edition appeared at Geneva, based on Tin-dall's-the work of Whittington, Coverdale, Goodman, John Knox, and other exiles-and commonly called the Geneva (or Breeches) Bible (from "breeches" standing instead of "aprons" in Gen. 3:7). This version, for 60 years the most popular in England, was allowed to be printed in England under a patent of monopoly in 1561. It was the first printed in Roman letters, and was also the first to adopt the plan previously adopted in the Hebrew of a division into verses. It omitted the Apocrypha, left the authorship of the Epistle to the Hebrews open, and put words not in the original in italics. The Bishops' Bible, published 1568 to 1572, was based on Cranmer's, and revised by Archbishop Parker and eight bishops. It succeeded Cranmer's as the authorized version, but did not commend itself to scholars or people. In 1582 an edition of the New Testament, translated from the Latin Vulgate, appeared at Rheims, and in 1609-10 the Old Testament was published at Douay. This is the version recognized by the Roman Catholic Church.

In the reign of James I a Hebrew scholar, Hugh Broughton, insisted on the necessity of a new translation, and at the Hampton Court Conference (1604) the suggestion was accepted by the king. The work was undertaken by forty-seven scholars divided into six companies, two meeting at Westminster, two at Oxford, and two at Cambridge, while a general ford, and two at Camoriuge, while a por-committee meeting in London revised the portions of the translation finished by each. revision was begun in 1607, and occupied three years, the completed work being published in folio in 1611. By the general accuracy of its translation and the purity of its style it superseded all other versions. In response, however, to a widely-spread desire for a translation even yet more free from errors, the Convocation of Canterbury in 1870 appointed a committee to consider the question of revis-ing the English version. Their report being favorable, two companies were formed, one for the Old Testament and one for the New, consisting partly of members of Convocation and partly of outside scholars. Two similar companies were also organized in America to work

along with the British scholars. The result was that the revised version of the New Testament was issued in 1881; that of the Old Testament in 1884. The revision has been carried out in a spirit of reverence toward the older version, and few alterations have been admitted but such as have been called for on the score of accuracy, clearness, and uniform-ity. See the revisers' prefaces.

In Germany some seventeen translations of the Bible, partly in the High German partly in the Low German dialect, appeared between the invention of printing and the Reformation. but they had all to make way for Luther's great translation — the New Testament in 1522, and the whole Bible in 1534.

Bibliog'raphy (Gr. biblion, a book, and grapho, I describe), the knowledge of books, in reference to the subjects discussed in them, their different degrees of rarity, curiosity, reputed and real value, the materials of which they are composed, and the rank which they ought to hold in the classification of a library. The subject is sometimes divided into general, national, and special, bibliography according as it deals with books in general, with those of a particular country, or with those on special subjects or having a special character (as, early printed books, anonymous books). A subdivision of each of these might be made into material and literary, according as books were viewed in regard to their mere externals or in regard to their contents. American literature has already given rise to a series of bibliographical works; e. g., Bibliographical Catalogue of Books, Translations of the Scriptures, and other publications in the Indian tongues of the U. S., 1849; Duyckinck's Cyclopedia of American Literature, 1856; Trübner's Bibliographical Guide to American Literature, 1856; and the General American Catalogue.

Bicarbonate, a carbonate derived from carbonic acid by replacing one of the atoms of hydrogen by a metal. Bicarbonate of sodium is used as an ant-acid, and effervescing liquors are usually produced by mixing it with tar-taric acid. It is also the chief ingredient of baking powder.

Bice, the name of two colors used in painting, one blue, the other green, and both native carbonates of copper, though inferior kinds are also prepared artificially.

Biceps, the large muscle in front of the up-

per arm. See Anatomy. Bichat (bö-shä), MARIE FRANCOIS XAVIER (1771-1802), French anatomist and physiologist, b. at Thoriette. Bichat was the first who recognized the identity of the tissues in the different organs.

Bicycle. In 1818 something in the nature of bicycle was introduced into England by Baron von Drais, a Frenchman, resident at Mannheim, and was known as the Draisnene (or Celerifere); while velocipedes or manumotive machines with three or more wheels were in occasional use in England even before that date, one of the earliest being an invention of Richard Lovell Edgeworth (1767). The Draisnene consisted of two wheels, about 30 inches

in diameter, running one in the wake of the other, and connected by a beam of wood, upon which, midway from each end, was placed a saddle or perch. At the fore-end of the beam an arm-rest was secured, and this roughly completed the apparatus. The rider placed his leg over the beam, got into the saddle, and, resting his arms upon the support referred to, pushed the "dandy-horse" ahead by kicking the ground with his right and left foot alternately. The fashioning of the first practical bicycle (1846) is credited to one Gavin Dalzell. a Scotch cooper, who lived at Lesmahagow, in Lanarkshire. It went by the name of the "wooden-horse," being constructed chiefly of wood; the saddle was low, and the pedal move-ments or "stirrups," which moved backward and forward alternately, were connected by iron rods with the cranked axle of the drivingwheel. The next revival of cycling may be said to date from 1867. A few years previous to this it occurred to an inventive genius, M.



The "Dandy-horse."

Michaux, to fit to the hobby-horse a pair of pedals by which the front wheel might be revolved with the feet. A transverse handle was affixed to the front wheel, which admitted of its being turned even to a right angle. This newcomer was known as the bicycle, but it is now irreverently alluded to in all quarters as the "boneshaker"—probably because it was made of wood and shod with iron tires instead of rubber. The utility of the cycle is proved beyond all question. It has become the poor man's carriage, and the rich man's hobby in more senses than one. Clergymen visit their parishioners, medical men their patients, and tens of thousands transact their business or follow their pleasures by its means, while it is next to impossible to pass through any of our towns without seeing that the cycle, in some of its numerous shapes, is ably ministering to the wants of the community. As with most other sports or pastimes, cycling is strong in a clubdom of its own. Hundreds of local clubs exist in different parts of the country. Cycleracing, by both amateurs and professionals, has developed into a fine art. Cinder-paths. specially constructed for the purpose, exist in nearly all the more important centers, and amateur race meetings are of frequent occurrence during the summer season. Cycling is not only extremely popular among the sterner sex, but ladies innumerable have taken to the pastime. Many devices for reducing the labor required to propel a machine over heavy roads and up steep gradients have from time to time been devised. A simple method of ascertaining how a machine is geared is to multiply the diameter of the driving-wheels by the number of teeth in the lower cog-wheel, and then divide by the number of teeth in the cog upon the main axle; e. g., a 40-inch wheel has 20 teeth upon its lower cog-wheel, and fifteen upon the upper; this gives a gearing of 53‡ inches.

Trick-riding is an art which the American riders assiduously practise, and in which they naturally excel; so much so, that many professors thereof have from time to time visited Europe to exhibit their provess to the multitude. Within the last few years skilled and competent engineers and mechanics have turned their attention to the perfecting of the cycle. There are a large number of flourishing cyclist clubs in the large cities, such as New York, Brooklyn, Philadelphia, Chicago, and Washington. As might be expected, manufacturing enterprise has kept pace with the demand; and America is also well supplied with cycling literature.

The parts of a bicycle that separately represent different allied industries are the chain, the pedals, the handle, the saddle, the rims, and the tires. Every part may be, and fre-quently is, bought of specialty makers and assembled in almost any make of machine that . is not an infringement of name. Many factories make all of the bicycle except the chain, saddle, pedals, steel bearing-balls, and the tires. The tubing that is used in the make-up of a bicycle comes to the factory in lengths of 12 to 20 feet. It is then cut into lengths needed The tubin the construction of the bicycle. ing employed in making a light bicycle is from a half inch to an inch and a quarter in diameter and varies from 20 to 24 gauge in respect to the thinness of the shell. **Tubing of** 24 gauge is very thin compared with the heavy material used a few years ago, and the tend-ency is to adopt tubings of large diameter and very light gauge. The cuts of tubing are sent to the forges and prepared for joining at the different points in putting together the frame of the bicycle. The frame consists of eight pieces of tubing, the upper, lower and middle braces, rear fork, rear brace, and the head, including the bracket or cylinder attached at the lower junction where the shaft turns. The frame is put together by the brazing process. This consists in joining together two pieces of metal by first covering the ends with borax and spelter, and then heating the joint in a furnace, until the spelter accomplishes a complete union of the parts. Spelter is copper and zinc or a high grade of brass in granulated form. The frame is then ready to receive the enamel. It is dipped into a vat of enamel, the ends having been first plugged with cork, and hung up to dry. The next step

is to bake it. It is put into an oven where a tremendous heat is brought to bear, and the enamel becomes so hard it is almost a part of the metal. The frames hang from brackets overhead until they are dry, and they are then brought to the department known as the assembling room. Pieces of steel for the hubs and other turned parts come in the form of bars, and are reduced to about the shape wanted by means of a machine that works automatically. The machines are started and allowed to run until the bars are cut into screws, hubs, or whatever is wanted. All these pieces are sent to the different departments to be tempered, polished, and nickeled, the hubs finally going to the room where the spokes are put in. Hollow material is employed wherever possible in order to decrease the weight of the machine. Crank brackets are made of tubing instead of forging, and wherever an ounce can be drilled out or turned off it is done in the search for lightness with attendant strength.

The manufacture of wooden rims like the manufacture of pneumatic tires constitute a separate industry. The bicycle wheel belongs to the order of suspension wheels. The wheel is made up of a drop-forged steel hub, steel wire spokes, and a steel or wooden rim. The wooden rims are brought into the factory where the spoke holes are drilled into them. A set of spokes require slanting holes in the rim, and every hole must slant in an opposite direction. There are 16 spoke holes in the front wheel, 18 in the rear wheel. The wire for the spokes comes in spools or bundles and must be straightened out before it is cut into proper lengths. The spoke at the tire and hub ends is twice as thick as the original wire. The metal is driven down on to itself, giving the spoke more body at the ends. Another machine cuts a thread on the rim, and still another bends the head or spoke end so that it will hook into the flange of The spokes are then plated with the hub. nickel, polished, and taken to the assembling room. The steel hub comes from the drop forge in a solid piece, but not bored out. A series of lathes shape the hub and bore it for the spindle, and a gang drill which bores eight holes at once fits it for receiving the spokes. The hub comes to meet the rim and spokes all fitted with ball-bearings. The wire spokes are slipped through the holes in the flanges, after which the rim is put on. The spokes are which the rim is put on. fastened on the outside of the rim by means of screws. After the rim has been put on, the wheel is put in a spindle which is perfectly The hub of the wheel is also perfectly true. true, and the hub will revolve squarely and evenly on this test spindle. The rim, however, does not at first revolve uniformly, or in other words, it is not true. A gauge is set near the edge of the rim, and the wheel is revolved. The fault is corrected by a workman who fastens and tightens first one spoke and then another until the tension is the same on all sides. The projecting ends of the spokes are ground down even, and the wheel is ready to receive the pneumatic tire. The polished steel balls,

which make the ball-bearings, are examined very closely with a magnifying glass and carefully sorted. If there are any imperfections in any of the balls, they are thrown out. In the assembling room the finished parts of the machine are all brought to the benches of the workmen, who quickly set up the bicycle and make it ready for the crate in which it is to be shipped.

Biddle, JAMES (1783-1848), American naval officer. He was educated at the University of Pennsylvania; entered the navy as a midshipman in 1800; served in the war with Tripoli; was captured in the frigate *Philadelphia*, and confined for four months. During the War of 1812 he was on the *Wasp*, and led in the action against the *Frolic*, which he com-manded after its capture. Both vessels were taken by the British ship Poictiers, and conveyed to the Bermudas. After his exchange in March, 1813, he was given command of a flotilla of gunboats on the Delaware, and transferred to the Hornet, in Decatur's squadron, blockaded at New London, Conn. He escaped and captured the Penguin off the island Tristan d'Acunha, in March, 1813, for which Congress gave him a gold medal. In February, 1815, he became captain. During his command of the Mediterranean squadron, 1831, he negotiated a commercial treaty with Turkey, and was engaged in diplomatic service in China in 1845.

**Biddeford,** York co., Me., on Saco River, 100 mi. n. of Boston. Railroads: Boston & Maine; Eastern & Electric. Industries: cotton mills, brass and iron foundries, lumber mills, shoe, box, and other factories. Surrounding country agricultural. The town was first settled in 1630 at the Pool, which was then "Winter Harbor," and embraced the city of Saco, directly across the harbor, until 1718 when it was incorporated as a town, and became a city in 1855. Pop. est. 1897, 16,000.

**Biddle**, JOHN (1615-1662), father of the modern Unitarians, Gloucestershire. He was educated at Oxford, and became master of a free-school at Gloucester. He was repeatedly imprisoned for his views. A general act of oblivion in 1652 restored him to liberty, when he immediately disseminated his opinions by his *Twofold Scripture Catechism*. He was again imprisoned, and the law of 1648 was to be put in operation against him when Cromwell banished him to St. Mary's Castle, Scilly, and assigned him 100 crowns annually. Here he remained three years. He then continued to preach his opinions till the death of Cromwell, and also after the Restoration, when he was committed to jail in 1662.

**Bideford** (bid'e-ford), a seaport of England, county Devon, 44 mi. n. of Plymouth, picturesquely situated on both sides of the Torridge, 4 miles from the sea. Its industries embrace coarse earthenware, ropes, sails, etc. Its shipping trade was formerly large, but is not now of much importance. Pop. 7,908.

**Bidery**, an alloy primarily, composed of copper, lead, tin, to every 3 oz. of which 16 oz. of spelter (zinc) are added. Many articles of Indian manufacture, remarkable for elegance of form and gracefully engraved patterns, are made of it. It is said not to rust, to yield little to the hammer, and to break only when violently beaten. Articles formed from it are generally inlaid with silver or gold and polished.

Biddle, NICHOLAS (1750-1778), American naval officer, b. in Philadelphia. He entered the British navy in 1770, but absconded and sailed under Nelson in the Carcass in the exploring expedition of Captain Phipps. At the beginning of the War of Independence he returned to Philadelphia, was made captain of the brig Andrew Doria, with 14 guns and 120 men; served in Commodore Hopkins's attack on New Providence, and cruised off Newfoundland. In February, 1777, he was appointed commander of the Randolph, a frigate of 32 guns. Soon afterward he was made commander of a small squadron and cruised in the West Indies, where he encountered the Yarmouth, a British frigate of 64 guns, and was wounded in the action. During the engagement the magazine of Commodore Biddle's vessel exploded, and he and his crew were blown up. Only 4 of the 315 men escaped.

**Biddle**, NICHOLAS (1786-1844), American banker. He studied law, became secretary to James Morroe, who was then minister to England, and was elected to the legislature of Pennsylvania in 1810. In 1819 he became a director, and four years later was president of the U. S. bank 1825-39. He had a protracted fight with General Jackson over the withdrawal of the government deposits in 1833. He was one of the founders of Girard College.

Blela's Comet (bč'la), discovered by M. Biela (1782-1856), an Austrian officer, in 1826. Its periodic time was determined as six years, thirty-eight weeks. It returned in 1832, 1839, 1846, and 1852. On the latter two occasions it was in two parts, each having a distinct nucleus and tail. It has not since been seen as a comet; but in 1872, 1870, and 1885, when the earth passed through the comet's track, immense flights of meteors were seen, which have been connected with the broken up and dispersed comet.

**Bielefeld** (bē'le-felt), a town of Prussia, in the province of Westphalia, 38 mi. e. of Münster; one of the chief places in Germany for flax spinning and linen manufacture. Pop. 39,950.

**Bienne** (bi-ān) (or Biel), a town, Switzerland, canton of Bern, 16 mi. n. w. of Bern, beautifully situated at the n. end of the lake of same name, and at the foot of the Jura. Pop. 18,487. The lake is about 10 mi. long by 3 broad. It receives the waters of Lake Neufchâtel by the Thiel and discharges itself into the Aar.

**Bienville**, JEAN BAPTISTE LE MOYNE, SIEUR DE (1680-1768), governor of Louisiana. He accompanied Iberville, who was commissioned by the French government to explore the mouth of the Mississippi and erect a fort there. They settled at Biloxi, 1609, and Bienville explored the country and erected a fort 54 mi. above the mouth of the river in 1700. In 1701 he became director of the colony, and removed its capital to Mobile, but was discharged from his office in 1707. A new colony having been formed by Law's Mississippi company. Bienville was made its governor, and founded the city of New Orleans in 1718. He transferred the capital of Louisiana to New Orleans in 1723, and in January, 1724, was called He was removed from his post on to France. Aug. 9, 1726, but in 1733 he was again made governor of Louisiana, with the rank of lieutenant general. He published a code which regulated the condition of slaves, prohibited every religion except the Roman Catholic, and banished Jews from the colony; this remained in force until Louisiana was purchased by the **U.** S

**Bierstadt**, ALBERT, painter, b. 1830 in Düsseldorf, Germany: came to America when a child. He studied art in Europe, but chose California and Colorado as the field for his work. His specialty is mountain scenery, and he painted Laramie Peak, Lander's Peak. Mt. Hood, and other peaks of the Rockies and the Sierra Nevada. He is a member of the National Academy and of the St. Petersburg Academy of Fine Arts.

**Bigelow**, JOHN, journalist, b. 1817 in Malden, N. Y.: became part owner of the New York *Erening Post* in 1849, and managed that paper until 1861. In 1861 he was sent to Paris as consul, and was U.S. minister there 1865-67. In 1867-68 he went over to the Democratic party, and was elected secretary of state of New York. Mr. Bigelow has written lives of Fremont, Bryant, and has edited Franklin's autobiography and Tilden's speeches.

**Biggar**, JOSEPH GILLIS (1828-1890), Irish politician. He was elected to Parliament from Cavan as a Home Ruler in 1874, and became known as the champion obstructionist of the House of Commons. He was twice prosecuted for sedition and conspiracy, but both juries disagreed.

**Big Horn**, a river of Wyoming and Montana, the largest tributary of the Yellowstone. Course, 400 mi.

**Big-horn;** the wild sheep of the Rocky Mountains, named from the size of its horns, which are 34 ft. long, the animal itself being of the same height at the shoulder. The bighorns are gregarious, going in herds of 20 or 30, frequenting the craggiest and most inaccessible rocks, and are wild and untamable. It is called also Rocky Mountain goat.

**Bigno' nia**, a genus of plants of many species, inhabitants of hot climates, usually climbing shrubs furnished with tendrils; flowers mostly in terminal or axillary panicles; corolla trumpet-shaped, hence the name of *trumpet-flower* commonly given to these plants. All the species are splendid plants when in blossom, and many of them are cultivated in our gardens.

**Big Rapids,** Mecosta co., Mich., on Muskegon River, 56 mi. n. of Grand Rapids. Railroads: G. R. & I.; C. & W. M.; and D. G. R. & W. Industries: furniture manufacturing, flour mill, and a number of smaller factories. Surrounding country agricultural. The town was first settled in 1854 and became a city in 1869. Pop. est. 1897, 5,000.

**Bikaner'**, a native state of Rájputána. India, under the superintendence of a political agent and the governor general's agent for Rájputána. Area 23,000 sq. mi.; pop. 831,955. BikANER, the capital, is surrounped by a fine wall 3j miles in circuit. It has a fort, containing the rajah's palace, is irregularly built, but with many good houses, and manufactures blankets, sugar candy, pottery, etc. Pop. including suburbs, 56,252.

**Bilaspur** (bi-läs-pör'), a district of the Central Provinces of India. Area 7,798 sq. mi.; pop. 1,017,327. The administrative headquarters of the district are at Bilaspur, which is also the principal town. Pop. 7,775.

**Bilba**'o, a city in Northern Spain, capital of the province of Biscay (or Bilbao), on the navigable Nervion, 8 miles from the sea. It has a cathedral and several convents; also manufactures of hardware, earthenware, leather, and paper, and possesses large shipyards and iron foundries. It exports large quantities of iron ore. Pop. 50,772.

**Bilboes** (bil'boz), an apparatus for confining the fect of offenders, especially on board ships, consisting of a long bar of iron with shackles sliding on it and a lock at one end to keep them from getting off, offenders being thus "put in irons."

Bile, a yellow, bitter liquor, separated from the blood by the primary cells of the liver, and collected by the biliary ducts, which unite to form the hepatic duct, whence it passes into the duodenum, or by the cystic duct into the gall bladder to be retained there till required for use. The most obvious use of the bile is to aid in the digestion of fatty substances and to convert the chyme into chyle. Everv kind of bile contains two essential constituents, the bile salts and the bile coloring matter associated with small quantities of cholesterine, fats, chloride of sodium, phosphates, and iron. When bile is not secreted in due quantity from the blood the unhealthy condition of biliousness results.

**Bil'iary Cal culus,** a concretion which forms in the gall bladder or bile-ducts; gallstone. It is generally composed of a peculiar crystalline fatty matter which has been called *cholexterine*.

**Bill**, a written or printed paper containing a statement of any particulars. In common use a tradesman's account, or a printed proclamation or advertisement, is thus called a bill. In legislation a bill is a draft of a proposed statute submitted to a legislative assembly for approval: but not yet enacted or passed and made law. When the bill has passed and received the necessary assent, it becomes an act.

Bill of Exchange (including promissory notes and inland bills or acceptances).—A bill of exchange is deflued as an order in writing addressed by one person to another, signed by the person giving it, requiring the person to whom it is addressed to pay on demand or at a

fixed or determinable future time a certain sum of money to or to the order of a specified person or to bearer. Bills of exchange are divided into foreign and inland bills, but in mercantile usage the term bill of exchange is seldom applied to other than foreign bills. An inland bill of exchange, generally called a bill of acceptance, has more in common with a promissory note than with a foreign bill of exchange. We give the common forms of the three documents.

\$110.00.

## (1) Promissory Note.

Chicago, April 2, 1898.

Three months after date I promise to pay to the order of W. S. [or "to W. S. or his order"] the sum of One Hundred and Ten Dollars, for value received. (Signed) J. D.

(2) Inland Bill of Acceptance.

\$110.00.

Philadelphia, Jan. 1, 1898. Three months after date pay to our order [or "to the order of J. S."] the sum of One Hundred and Ten Dollars, for value received.

(Signed) F. G. & Co. To Messrs. A. B. & Co., Baltimore, Md.

This form is accepted by writing across the body of the bill:—

"Accepted.

A. B. & Co."

(3) Foreign Bill of Exchange.

\$110.00.

Lima, O., Jan. 1, 1898.

At sixty days' sight of this first of exchange (second and third of same tenor and date unpaid) pay to the order of W. S. the sum of One Hundred and Ten Dollars, value as advised [or, "which charge to our account," or "to account of — as advised."]

(Signed) F. & Co.

To F. B. & Co., Liverpool.

(Second and third drawn in same form as first, one only of the set being negotiable. Instead of three copies being used, which is called drawing a bill in parts, one only may be drawn, the form then used being "this sola of exchange.")

The acceptor of this bill writes across it the date on which it is presented, together with his signature, thus:—

# "Accepted, Feb. 4, 1898. F. B. & Co."

The person who makes or draws the bill is called the *draver*, he to whom it is addressed is, before acceptance, the *dravee*, and after accepting it, the *acceptor*; the person in whose favor it is drawn is the *payee*; if he endorse the bill to another, he is called the *endorser*, and the person to whom it is thus assigned is the *endorsee* or *holder*. A bill when properly stamped is negotiable, and may be discounted at a bank, or may pass from hand to hand by the process of endorsement; many names being frequently attached to one bill as endorsers,

each of whom is liable to be sued upon the bill if it be not paid in due time. The last phase in the negotiation of a bill is usually its being discounted with a banker. The merchant may either discount it with a billbroker, who re-discounts it with the banker, or he may take it direct to the banker. The broker or banker deducts (as do also the previous negotiators of a bill) a discount, or equivalent for the use of the money he pays until the due date of the bill, when he expects it will be repaid him. When a bill reached the date of payment, and was not duly paid, it used to be noted or protested, but this is now only done with foreign bills. Protesting is a legal form, in which the payee is declared responsible for all consequences of the non-payment of the bill. Noting is a temporary form, used as a preliminary to protesting. It consists in a record by a notary public of the presentation of the bill, and of the refusal of the payee to honor it. Unless a bill is noted for non-payment on the due date, the endorsers are freed from responsibility to pay it. In determining the due date of a bill, a legal allowance, varying in different countries, called *days of grace*, has to be taken into account. A bill of exchange drawn and accepted merely to raise money on, and not given, like a genuine bill of exchange, in payment of a debt, is called an accommodation bill.

Bill of Health, a certificate or instrument signed by consuls or other proper authorities, delivered to the masters of ships at the time of their clearing out from all ports or places suspected of being particularly subject to infectious disorders, certifying the state of health at the time that such ships sailed.

Bill of Indictment, a written accusation submitted to a grand jury. If the grand jury think that the accusation is supported by probable evidence, they return it to the proper officer of the court endorsed with the words "a true bill," and thereupon the prisoner is said to stand indicted of the crime and bound to make answer to it. If the grand jury do not think the accusation supported by probable evidence, they return it with the words "no bill," whereupon the prisoner may claim his discharge.

Bill of Lading, a memorandum of goods shipped on board a vessel, signed by the master of the vessel, who acknowledges the receipt of the goods and promises to deliver them in good condition at the place directed, dangers of the sea excepted. Bills of lading can be transferred by endorsement; the endorsement transfers all rights and liabilities under the bill of lading of the original holder or consignee.

Bill of Sale, a formal instrument for the conveyance or transfer of personal chattels, as household furniture, stock in a shop, shares of a ship. It is often given to a creditor in security for money borrowed, or obligation otherwise incurred, empowering the receiver to sell the goods if the money is not repaid with interest at the appointed time, or the obligation not otherwise discharged.



**Bli leting**, a mode of feeding and lodging soldiers when they are not in camp or barracks by quartering them on the inhabitants of a town. The necessity for billeting occurs chiefly during movements of the troops or when any accidental occasion arises for quartering soldiers in a town which has not sufficient barrack accommodation. The billeting of soldiers on private householders is prohibited in America except in war time.

Billiards is a well-known indoor game of skill, played on a rectangular table with ivory balls, which are driven by means of an ash rod or stick called a "cue" against each other according to certain defined rules. Of the origin of billiards comparatively little is known some considering that the game was invented by the French, and others that it was improved by them out of an ancient German diversion. Even the French themselves are doubtful on the point, some of their writers ascribing the game to the English. Billiards appear to be derived from the game of bowls. The strokes are all made with  $\bar{a}$  cue, which is a long stick of ash, or other hard wood, gradually tapering to the end, which is tipped with leather and rubbed with chalk to prevent it slipping off the surface of the ball struck. The mace or hammer-headed cue, once common, is now no longer used, even by ladies. The cue is taken in the right hand, generally between the fingers and the thumb, and is not grasped in the palm; and with the left hand the player makes a bridge, by resting the wrist and the tips of the fingers on the table, arching the latter, and extending the thumb in such a way as to allow a passage in which the cue may slide. The shape of the table has varied from time to time. At first it was square, with a hole or pocket at each corner to receive the balls driven forward with a cue or mace; then it was lengthened and provided with two other pockets; and occasionally it has been made round, oval, triangular, or octagonal, with or without pockets, according to the game required. It is covered by a fine green cloth, and surrounded by elas-tic india-rubber cushions. The table must be perfectly level and sufficiently firm to prevent vibration; and its usual height from the floor to the surface is three feet.

The game as played in America, has taken a distinctive character, both in regard to the manner in which, and the tables on which, it is played. The older American game was the four-ball game (now rarely played by experts), and it was at first played on a six-pocket table, after the English pattern, and then on a fourpocket table, and finally on a pocketless table. Formerly the caroms were combined with winning hazards, losing hazards counting against the player. Caroms and hazards counted two and three points respectively; but latterly, since the abolition of pockets, the points of the game number usually thirty-four, each carom uniformly counting one. At the commencement of the game the players "string for lead," which is done by each simultaneously driving his ball against the bottom cushion, the ball

approaching and resting nearer to the head cushion on the rebound deciding the winner both as to choice of balls and order of play. If the striker fail to hit any ball with his ball, he forfeits one to the opposing side, or if he drive his cue ball off the table he forfeits three. If, however, the player's ball be in contact ("froze") with another ball at the time he makes a stroke, he does not forfeit if he fail to strike some other ball. Foul strokes are made when one player plays another's ball, when he plays at a ball in motion; when a player does not withdraw his cue from his ball before that ball comes in contact with another; when a stroke is made while the red ball is off the table and its spot is unoccupied; when a player in making a shot touches his cue-ball twice; when a player in any way ob-structs the motion of a ball; when a player has not at least one foot on the floor while making a shot; when a player does not cause a ball in hand to pass outside the string before touching an object ball or a cushion, except when an object ball lies partly outside and partly inside the string; when a player plays directly at a ball inside the string; when a miss is given inside the string when a player is in hand; when a player at some one's suggestion alters his intended stroke.

The three-ball game is played with two white and one red ball. The table has two spots, one each at head and foot of table. The spot at head of table is called the white spot. and the one at the foot the red spot. The game is begun by stringing for lead as already described in the four-ball game. Should the first player fail to count, his opponent can play at either ball on the table. A carom consists in hitting both object balls with the cue ball. Each carom scores one. Each miss forfeits one to the opposite side. If a ball jumps off the table after counting, the count is good and the ball must be spotted. The foul strokes are about the same as have been given above. When the cue ball is in contact with another the balls are respotted and the player plays ball in hand as at the commencement of the game. The object balls are considered crotched when they lie within a four-and-one-half-inch square at either corner of the table. When in such position three counts only will be allowed unless one or both the object balls be forced out of the square. The crotch has at times on special occasions been enlarged to restrict rail play, but such enlargement is not generally accepted. The cushion carom game is a highly scientific play, it being necessary to a successful carom that the cue ball shall, in the course of the stroke, strike not only both object balls, but the cushion as well. The balk line is another limitation which has been imposed on the older game; in this form of the game a balk line either eight or fourteen inches from the rail is established, and the player is compelled to drive one or both object balls outside the line in order to count. The points of the game are usually thirty-four, fifty, or one hundred. In match games various handicaps are agreed on, but the social game is generally played as above.

In the English game the object of the player is to drive one or other of the balls into one or other of the pockets, or to cause the striker's ball to come into successive contact with two other balls. This game resembles the American game of pool more than billiards.

Billiard Balls are made usually from ivory. When a tusk reaches the manufacturer of billiard balls it is examined very carefully for flaws. If it be found perfect the workmen measure the tusk into proper distance to be cut into blocks. It is then sawed into lengths of 24 to 3 inches, according to the size of the balls to be made, and the turners take the blocks in hand. In order to save the corners, the turners cut a ring at each end and slowly deepen it until a rough ring drops off. Two rings are cut from each billiard ball block, after which it is almost round. It is then laid aside to dry for about six months. When it has been seasoned it is chiseled down smooth and exactly round. The ball is then polished by means of a machine, and treated to a rubbing with chalk and chamois skin, and finally with a plain, soft leather.

Every particle of sawdust and shavings from the ivory is carefully saved. These are treated with chemicals, submitted to an enormous hydraulic pressure, and molded into small articles so perfect that only an expert can tell them from solid ivory. The most expert carvers are the Japanese and Chinese, who spend years on a single piece.

**Bif lingsgate**, the principal fish market of London, on the left bank of the Thames, a little below London Bridge. It has been frequently improved, and was rebuilt in 1852 and again in 1874-76. From the character, real or supposed, of the Billingsgate fish-dealers, the term *Billingsgate* is applied generally to coarse and violent language.

**Billiton'**, a Dutch East Indian island between Banca and the s.w. of Borneo. It produces iron and tin, and exports sago, cocoanuts, pepper, tortoise-shell, trepang, edible birds'-nests, etc. It was ceded to the British in 1812 by the sultan of Palembang, but in 1824 it was given up to the Dutch. Area 1,863 sq. mi.; pop. 29,115.

**Bil fon**, an alloy of copper and silver, in which the former predominates, used in some countries for coins of low value, the object being to avoid the bulkiness of pure copper coin.

**Bimet' allism**, that system of coinage which recognizes coins of two metals (silver and gold) as legal tender to any amount; or in other words, the concurrent use of coins of two metals as a circulating medium, the ratio of value between the two being arbitrarily fixed by law. It is contended by advocates of the system that by fixing a legal ratio between the value of gold and silver, and using both as legal tender, fluctuations in the value of the metals are avolded, while the prices of commodities are rendered steadier.

**Binding-twine**. The best binding-twine is made of East India manilla hemp. This is a product of the banana palm which grows in the Philippine Islands. Some hemp is also grown in Southern Mexico and Yucatan. This is a product of the plant known as the American aloe. This hemp comes to the factory in bales containing 275 to 375 pounds. The bales are torn apart and the separate bunches, which They are knotted at the end, are shaken out. are nearly white and very coarse, the fibers varying from two to six feet in length. The hemp goes to the scutching frame, which is a broad wheel about eight feet in diameter, the outer surface being covered with short, sharp pegs set close together. This is covered all over with a shield which is pierced at one side with square holes. Through these holes the hemp bunches are switched until the teeth have combed the fibers out straight, tearing out a good deal of dust and valueless fibers. The hemp now goes to the first spreader or breaker. This consists of two sets of belts, both covered with short, metallic teeth or pegs, the first moving more slowly than the second. In this machine the hemp is spread out, carded, and straightened. The second belt pulls it apart longitudinally and makes the ribbon finer. From the end of the first spreader, the big, loose rope is guided into tin pails from which it is fed into the second spreading machine, and so on through eight of them until the hemp ribbon is smooth and thin and much finer than at first. It is then run over numerous spools and rollers which smooth it down, twist it, making it finer and more compact. It goes then to the spindles. Here the ribbon of hemp runs from the pails through a very small hole where it is pulled very fast so that it grows finer, at the same time being twisted to a certain extent. It is then fed on big spools or bobbins in the form of finished twine, 650 feet to a spool. The twine is tested by a binder adjustment to see if it is perfect. The bobbins are now sent to the balling department where the twine is wound by machines from the bobbins into the shape of twine balls. The balls are made so that the twine unwinds from the inside out instead of from the out-side in. They are then ready for use in the harvest field.

**Bind-weed**, the common name for plants of the genus Convolvulus, especially of C. arvensis, and also of plants of the allied genus Calystegia, especially C. Soldanella and C. sepium. The black bryony is called black bind-weed; smilax is called rough bind-weed. Solanum Dulcamara (the bittersweet) is the blue bind-weed of Ben Jonson.

**Bing'en**, a town of Germany, in the grand duchy of Hesse-Darmstadt, at the confluence of the Nahe with the Rhine. Pop. 7,654. The district is noted for the culture of the vine, and the exquisite Rudesheimer is produced in the neighborhood. There are manufactures of tobacco, glue, starch, and leather, besides a brisk retail and river trade. The *Bingerloch*, formerly a dangerous rapid in the Rhine, lay below the town; but blasting operations carried on by the Prussian government in 1834 have entirely removed the danger to the navigation of the river. A tower, the Mäusethurm,

### Bingham

in the middle of the Rhine, erected probably about the year 1000, by Willigis, archbishop of Mainz, as a defense for the district, is celebrated in legend as the scene of the destruction by rats of the hardhearted Bishop Hatto in 969, the subject of one of Southey's bestknown ballads. Restored in 1856, the tower now serves as a beacon, warning ships, by means of a flag, if the Bingerloch is clear. The town is familiar to every one from the poem, "Bingen on the Rhine," so popular in schools.

Bingham, JOHN A., lawyer, b. in Mercer, Pa., in 1815; became a lawyer, and was elected to Congress from Ohio as a Republican and served from 1855-1863. He became judgeadvocate in the army, and in 1864 solicitor of the Court of Claims. He took part in the trial of Lincoln's assassins. He returned to Congress 1865-1873, and was one of the managers of the impeachment proceedings against Andrew Johnson. He was U. S. minister to Japan, 1873-1885.

**Bing'hampton**, Broome co., N. Y., on Susquehanna river. Railroads: Erie; D. L. & W. and branches; and D. H. C. Co. Industries: cigar factory, four flouring mills, and two foundries, carriage, comb, button, whip, shirt, cigar box, brush, chair, glass, sleigh, bicycle, and other factories. Surrounding country agricultural. The town was first settled in 1787 and became a city in 1867. Pop. est. 1897, 45,000.

**Bin nacle** (or bittacle), a case or box on the deck of a vessel near the steering apparatus, containing the compass and lights by which it can be read at night.

**Binoc'ular**, a field-glass or opera-glass, or a microscope suited for viewing objects with both eyes at once.

**Bino' mial**, in algebra, a quantity consisting of two terms or members, connected by the sign + or -. The *binomial theorem* is the celebrated theorem given by Sir Isaac Newton for raising a binomial to any power, or for extracting any root of it by an approximating infinite series.

**Bin'tang**, an island of the Dutch East Indies, at the s. extremity of the Malay Peninsula; area 468 sq. mi.; pop. 12,430; yields catechu and pepper.

**Bi'obio**, a Chilean river, rises in Lake Huchueltui, flows in a n. w. direction for 180 miles, and falls into the Pacific at the city of Concepcion. It gives name to a province of the country, with 100,000 inhabitants; area 4,158 sq. mi.

**Biogen** esis, the history of life development generally; specifically, that department of biological science which speculates on the mode by which new species have been introduced; often restricted to that view which holds that living organisms can spring only from living parents.

**Biog'raphy**, that department of literature which treats of the individual lives of men or women: and also, a prose narrative detailing the history and unfolding the character of an individual written by another. When written by the individual whose history is told, it is called an autobiography. This species of writing is as old as literature itself. In the first century after Christ Plutarch wrote his Parallel Lives; Cornelius Nepos, the Lives of Military Commanders; and Suctonius, the Lives of the Twelve Casars. Modern biographical literature may be considered to date from the seventeenth century, since which time individual biographies have multiplied enormously. Dictionaries of biography have proved extremely useful, Moreri's Dictionnaire Historique et Critique, 1671, being perhaps the first of this class. During the present century have been published the Biographie Universelle, 85 vols., 1811-62; Nouvelle Biographie Generale, 46 vols., 1852-66; Chalmers's General Biographical Dictionary, 32 vols., 1812-17; Rose's Biographical Dictionary, 12 vols., 1848-50; Leslie Stephen's Dictionary of National Biography, to be completed in about 50 volumes, the first of which appeared in January, 1885; and Appleton's Cyclopædia of Amer-ican Biography, 6 vols. (1887-1889).

Biology, a composite science embracing all the sciences which bear on the phenomena of life. We study life in the vegetable (see Botany) and animal (see *Zoology*) kingdoms; we study it as it is manifested in function (see *Physiology*), or in form (see Embryology, Anatomy, Comparative Anatomy, Morphology) or as it is seen responding to the great general laws which govern the movements of all matter throughout the universe (see Evolution). Up to the latter half of the eighteenth century, Biology was not recognized as an important science; nor was it considered possible to formulate laws which would be equally applicable to all forms and manifestations of life, whether animal or vegetable. Through the labors of Kant, Lamarck, E. and C. Darwin, Cuvier, von Baer and many others, but more than all, through the general tendency to inductive reasoning, which was the chief glory of the science of the century ending 1850, we now know it is possible to include all life under one broad definition, and that its laws are the same in whatever shape or function we find it. A good example of the difference between the immature biological thought of the early eighteenth century, and the more complete life-study of the present generation, is found by comparing Bichat's definition of life, as "the sum of all those forces that go to resist death"-a mere play upon words, ---with Herbert Spencer's deeply philosophical state-ment, that it is "the definite combination of heterogeneous changes, both simultaneous and successive, in correspondence with ex-ternal co-existences and sequences."

It is apparent from the definition by Mr. Spencer just cited, that the essence of life is the ability to change the organism from time to time — or rather, continuously, — in order to bring it into more favorable relations to the environments from which it must derive its sustenance. When this ability to change ceases, death must immediately ensue through starvation of the tissues. The simplest form of life is represented in the protozoa, in which the functions of reproduction, respiration, ali-

mentation, circulation, secretion, are all carried on within the walls of a single cell. With increased complexity of life, comes aggregation into cell-masses with specialization of function, certain duties being assigned to certain cells. Thus we see arising more or less highly differentiated cell-groups, to which we give the names of organs, as heart, liver, brain, lungs, kidney, stomach, etc.; or systems, as digestive, genito, urinary, muscular, vascular, nervous, etc. In response to a demand for cells of the varying sizes, shapes, resistances, tensile and contractile strengths, nervous energy, storage or metabolic qualities, etc., required in a complex animal, we find developing tissues which make up the above mentioned specialized cell groups, as bone, muscle, epithelium, nerves, connective tissue, blood vessels, fut. gland, etc.; or among plants, where cell differentiation fails to reach the perfection found in animals, we still find the parent cell modifying itself in the bark, trunk, leaf, root, or flower. Out of those variations in form, which changing environments and increase in cell numbers have forced the cell mass to assume in order that it may nourish, protect, and reproduce itself, have arisen species, genera, orders, classes, subkingdoms, and probably the animal and vegetable kingdoms themselves. Cells, or cell aggregations, thus possessed of life are said to be organic, in contradistinction to mineral substances, which are not capable of intelligent change in correspondence with environments, and are therefore lifeless and inorganic. Inseparably associated with these cell-masses endowed with life and function, we find the ability to develop, to grow, to reproduce, and the inevitable necessity to decay. These processes seem to exist as phases in a vito-chemical cycle, during the early stages of which, assimilation, repair and growth are in the ascendant, but in which, beyond the acme marked by the consummation of the reproductive functions, secretion, waste, and decay constitute the order of the day, until presently, the life-endowed molecules part entirely with their power to lead an organic existence, and sink back into the inorganic world. It is probable that the ability to appropriate the unstable element nitrogen from the surrounding media, constitutes the essential difference between living and the non-living matter. It is a matter of observation that those tissues and organisms containing the greatest admixture of this element seem to be associated with the most intense manifestations of life

The cell is at the foundation of all life, and all manifestations of life, however complex, must be regarded as originating therein, and produced through the reaction between cell and environments. The law, "omnis cellulæ cellulæ" (all cells from one cell), formulates this fact which was first made clear by the researches of Schleiden in Botany, and Schwann in Zoology (1838-39). These researches were made possible through the development of the compound microscope, by means of which the anatomy and physiology of the cell may be studied. Through the study of cellular

Biology, the active principle of life has been found not alone in the cell but also in a definite constituent of the cell itself. Every cell is made up of a clear substance known as protoplasm, enclosed within a cell-wall. Floating in the protoplasm and nourishing itself from it, is a nucleus made up of fine granular particles, tending to arrange themselves into threads, and called, from the fact that they stain more readily than the clear substance surrounding them, chromatin granules and filaments. It is within these granules that the life of the cell, and therefore the life of the entire organism, is now thought to reside. For it has been observed that the chromatin originates all the phenomena of cell life, and that, when the nucleus with its contained chromatin is removed, the cell presently perishes. Notwithstanding these morphological and physiological observations, which are distinct additions to our biological knowledge, we cannot be said to stand to-day any nearer to the secret of the motive power of life than did Aristotlethe first true student of Biology. We study its manifestations of form and function, and formulate laws therefrom; but the propelling force is still as mysterious to the philosopher as to the child.

The following table shows the comprehensibility of Biology:

Sheep } ]

Goat Dog Cat	Beast	]	
Ostrich Swallow	Bird	Animal (Zoology)	)
Trout Salmon	} Fish	}	
Cedar Oak	Tree	)	Organism (Biology)
Brier Bramble	Shrub	Plant (Rotany)	J
Balm Hyssop	} Herb	) (2014119)	

W. H. ALLPORT. Biot (bē-ō), JEAN BAPTISTE (1774-1862), French mathematician and physicist. He became professor of physics in the Collège de France in 1800, in 1803 member of the Academy of Sciences, in 1804 was appointed to the Observatory of Paris, in 1806 was made member of the Bureau des Longitudes, in 1809 became also professor of physical astronomy in the University of Paris. In connection with the measurement of a degree of the meridian he visited Britain in 1817. He is especially celebrated as the discoverer of the circular polarization of light.

**Birch**, a genus of trees which comprises only the birches and alders which inhabit North America, Europe, and Northern Asia. The common birch is indigenous throughout the n., and on high situations in the s. of Europe. It is extremely hardy, and only one or two other species of trees approach so near to the n. pole. The wood of the birch, which is light in color, and firm and tough in texture, is used for chairs, tables, bedsteads, and the woodwork of furniture generally, also for fish-casks and

### **Bird-catching Spider**

hoops, and for smoking hams and herrings, as well as for many small articles. In France wooden shoes are made of it. The bark is



Branch Common Birch, in Flower.

whitish in color, smooth and shining, separable in thin sheets or layers. Fishing-nets and sails are steeped with it to preserve them. In some countries it is made into hats, shoes, boxes, etc. In Russia the oil extracted from it is used in the preparation of accent to it. In and imparts the well-known scent to it. In the been made from it. The it is used in the preparation of Russian leather. Lapland bread has been made from it. sap, from the amount of sugar it contains, affords a kind of agreeable wine, which is produced by the tree being tapped during warm weather in the end of spring or beginning of summer, when the sap runs most copiously. The dwarf birch, a low shrub, two or three feet high at most, is a native of all the most northerly regions. The cherry-birch of America, and the black birch of the same country, produce valuable timber, as do other American species. The largest of these is the yellow birch which attains the height of 80 ft. It is named from its bark being of a rich yellow color. The paper birch of America has a bark that may be readily divided into thin sheets almost like paper. From it the Indian bark canoes are made.

Bird-catching Spider, a name applied to



Bird-catching Spider.

# Birds

gigantic spiders, more especially to one, a native of Surinam and elsewhere which preys upon insects and small birds which it hunts for and pounces on. It is about two inches long, very hairy, and almost black; its feet when spread out occupy a surface of nearly a foot in diameter.

**Birdlime**, a viscous substance used for entangling birds so as to make them easily caught, twigs being for this purpose smeared with it at places where birds resort. It is prepared from holly-bark, being extracted by boiling; also from the viscid berries of the mistletoe.

Bird of Paradise, the name for members of a family of birds of splendid plumage allied to the crows, inhabiting New Guinea and the adjacent islands. The family includes eleven or twelve genera and a number of species, some of them remarkably beautiful. The largest species is over 2 ft. in length. The king bird of paradise is possibly the most beautiful species, but is rare. It has a magnificent plume of feathers, of a delicate yellow color, coming up from under the wings, and falling over the



The Great Bird of Paradise.

back like a jet of water. The feathers of two other species are those chiefly worn in plumes. These splendid ornaments are confined to the male bird

**Birds** form the second class of the great division of vertebrate animals, the connecting link between the Mammalia and Reptilia, but are more closely allied to the latter. In common with the Mammalia they have warm blood, though of a higher and uniform temperature (8° to 12° higher), a heart with two auricles and two ventricles, and breathe by lungs; but differ from them in having feathers for a covering, two feet, wings, by means of which most of them are enabled to fly, a horny bill, and reproduction by eggs. The feathers, the development of which resembles essentially that of hair, constitute appendages of a unique kind, as being developed only in connection with the bird-class. The under-plum-

age of most birds is formed by a thick coating of small shaftless feathers, embedded in the skin and called down. Various names are given to feathers according to their position; thus the long quills on the part of the wing corresponding to the hand are called primaries, those on the lower fore-arm secondaries, and those on the upper part of the fore-arm *tertiaries*, those on the shoulder-blade and humerus scapulars. The feathers covering the bases of the wingquills are called wing-coverts, and those covering the rectrices, or great feathers of the tail, tail-coverts. Birds molt or renew their feathers periodically, and in many cases the winter plumage displays a different coloring from the summer plumage. The plumage in most cases is changed frequently before it attains its characteristic and full-grown state.

The mouth of birds takes the form of a beak or bill; the jaws or mandibles are hard and horny, and more or less prolonged into a point, while there are no fleshy lips and no teeth (except in certain fossil birds); a horny sheathing, generally smooth, but sometimes serrated, takes the place of the latter. The beak is variously modified in accordance with the habits of the bird and the nature of the food on which it subsists. The sense of taste is not keen, their tongue being generally slender, pointed, and more or less horny, though some birds, as the parrots, have it fleshy. The nostrils open upon the side, or at the base of the beak. Their sense of smell is often very delicate. A circle of naked skin called the cere in many birds surrounds the base of the mandibles. The sight of birds is extremely keen, and equally adapted for near and for distant objects. A peculiar feature in the eye is the nictitating membrane, a sort of third translucent eyelid which rests in the inner angle of the eye, but can be drawn over it so as to protect from too strong a light. Birds have no external ear, with the exception of the nocturnal tribes; these have a large exterior conch in the form of a thin leathery piece of flesh. The internal ear is very large,

and the sense of hearing very quick. The bone-tissue of birds is light and com-pact. The bones are whiter and contain a larger proportion of phosphate of lime than those of the Mammalia and lower vertebrates. The bones of most birds are *pneumatic*; that is, contain air instead of marrow, to adapt them for flight; the air being admitted by means of special apertures which are connected with certain sacs, termed air-cells, filled with air from the lungs. In many birds, however, the long bones are filled with marrow, as are also all the bones of young birds. The humeri, cranial bones, and sternum are most generally pneumatic, the femora more rarely so. The vertebræ vary considerably in number in dif-ferent species. The neck is always more or less elongated and flexible, and consists of from 9 to 23 vertebræ. The dorsal region, or region of the back, is composed of from 4 to 9 vertebræ, and is generally firm, forming a sup-port for the movements of the wings. In all birds the neck is of sufficient length to reach

the oil-gland situated at the tail, the secretion of which is used for "preening" or dressing The vertebræ interposed bethe feathers. tween the dorsal vertebræ and those of the tail are united to form the sacrum, the number of vertebræ which may thus coalesce varying from 9 to 20. The caudal or tail vertebræ may number ten, the last two or more of which unite to form a bone, called from its shape "plowshare" bone. In some species this bone is absent, undeveloped, or modified. The bones of the skull become firmly united at an early period, so as to leave few or no sutures or lines of union, as in mammals, a complete bony case being thus formed. The skull is joined, as in reptiles, to the spinal column by a single process, or condyle, of the occipital bone or hindermost bone of the skull. The chest or thorax is enclosed posteriorly by the dorsal vertebræ, laterally by the ribs, and in front by the sternum or breast-bone and the sternal ribs. The ribs correspond in number with the dorsal vertebræ, from 6 to 9 pairs of ribs being thus found in birds, the first two being generally unattached, that is, they do not reach the sternum in front. The sternum is large and strong, and serves as the point of attachment for the most powerful of the muscles by which the wings are set in motion. It is provided with a medial crest or keel, which is most prominent in the birds of most powerful flight, and is altogether absent in the ostrich and cassowary, birds which do not fly. Upon the upper or anterior portion of the sternum the coracoid bones are borne, which form the chief supports of the fore-limbs. At its upper portion each coracoid bone articulates with the scapula or shoulder-blade, and with one of the clavicles. The clavicles, or collarbones are united in most birds to form the furculum or merry-thought. The wing of the bird exhibits the essential skeletal elements found in the fore-limb of all other vertebrates. The humerus, or bone of the upper arm, is generally short; the fore-arm, composed of the radius and ulna, being the longest segment of the fore-limb. The ulna is larger and better developed than the radius, which is slender and attenuated. In the bones which form the extremity of the wing we recognize the rudiments of a thumb and two fingers, one of which has two phalanges and the other only one. The femur or thigh is short, the tibia or shin bone forming the chief element in the leg; while the fibula is attenuated and generally ossified to the tibia. The toes generally number four; the hallux, or great toe, when present, being composed of two phalanges, and the other toes of three, four, and five phalanges respectively. The muscles of birds are firm and dense, and are generally colored deep red. The chief body-muscles are the pec-torals, or those of the breast, which are devoted to the movements of the wings.

There are three stomachs or stomachic dilatations in birds: the first is the *crop*, a considerable pouch attached to the *asophagus* or *gullet*; then the *ventriculus succenturiutus*, a slight dilatation of the *asophagus*, with thick and
glandular walls; then immediately after this is the gizzard, a strong and muscular cavity. In granivorous birds the crop is large, and serves as a reservoir for the seeds swallowed by them, which are here moistened by a secretion before passing into the gizzard. In these birds the gizzard is extremely strong, having to perform the task of grinding down the hard substances subjected to its action, a process which is facilitated by the small stones which these birds generally swallow. The ventriculus secretes the gastric juice, and so far represents a real stomach. In birds which live on flesh or fish the gizzard is weaker and less distinct from the ventriculus, while the crop becomes smaller, and in some species completely dis-appears. The intestinal canal is relatively smaller than in Mammalia and presents fewer circumvolutions. It terminates in an opening called the *cloaca*, which is also the common termination of the ureters and oviduct. The liver is generally large, and colored a distinct brownish hue, which is deepest in aquatic birds. A gall-bladder is absent in a few cases only, as in the ostrich, pigeons, and some parrots. The kidneys are two in number, of large size and elongated shape. The spleen is usually of small size, rounded or oval, but may also be elongated, or broad and flattened. The heart is highly muscular, four-chambered; the blood, deep red in color, circulates rapidly and vigorously. The lungs are confined to the back portion of the body, and are attached to the ribs, instead of being free, as in Mammalia. They are not divided into lobes, and are usu-ally of a bright red color. They are enveloped in a membrane pierced with large holes which permit the air to pass into the cav-ities in the breast and in the abdomen, and, in some species, even into the interior of the bones. The trachea or windpipe is of great relative length in birds, and is adapted to the length of the neck. The nervous system evinces a marked superiority over that of reptiles. The cerebrum, or true brain, is larger than in the latter, but its surface is not convoluted, as in most Mammalia. The eggs are hatched by the process of incubation. Very great differences exist in the size, form, and number of eggs which may be produced by birds, and in the time required for their hatching. The varieties of nests in which they are deposited, as to mode and materials used in construction, are endless.

Many birds migrate at certain seasons from one country to another, and a recent report on migration shows, that with very few exceptions, there is scarcely a bird of either the palæarctic or nearctic regions that is not, to a greater or less degree, migratory in some part or other of its range. See *Migration*.

As for the classification of birds many systems have been proposed. A common division is into seven orders, to which an eighth, the *Saururae* of Huxley, is often added, to include the extinct archæopteryx. These orders are:—

Order I.—RAPTORES (or Accipitres). Birds of prey, as eagles, vultures, hawks, and owls. Beak strong and curved, sharp at the edges.

Feet adapted for seizing and destroying other animals. Claws sharp, much hooked, and retractile. Hind toe on the same level with the others. Wings well developed. Order II.—INSESSORES (*Passeres*), or perching

Order 11.—INSESSORES (*Passeres*), or perching birds, by far the most numerous order. It includes all the singing birds, and indeed excluding the birds of prey, most birds which live habitually among trees. Feet formed for grasping and perching, claws moderately curved and not retractile. Hind toe on the same level as the rest. This order is usually divided into four *tribes* or sub-orders: conebilled; tooth-billed; slender-billed; cleft-billed.

Order III. — SCANSORES (or Zygodactyk). Climbing birds, as the parrots, woodpeckers, cuckoos, toucans, etc. Feet formed for climbing, two of the toes directed forward and two backward; powers of flight not in general great; bill variously shaped.

Order IV.--RASORES (or *Galling*). Domestic fowls, pheasants, pigeons, etc. Legs large and strong. Feet with the hind toe situated above the heel, suited for scratching. Bill short, thick, and arched above.

Order V.—CURSORES (or *Struthionidæ*). Running birds, as the ostrich, emu, cassowary, etc. Wings rudimentary, and quite useless for flight; legs long and strong; hind toe wanting or merely rudimentary; breast-bone without a ridge or keel.

Order VI. — GRALLATORES (or *Gralla*). Waders, as the cranes, herons, snipes, sandpipers, etc. Legs long, bare of feathers from above the knee; toes often half-webbed. Bill in general long and slender.

Order VII.—NATATORES (or *Palmipedes*). Swimmers: web-footed birds, as ducks, geese, gulls, etc. Feet formed for swimming, in general webbed, that is the toes connected by a membrane. Hind toe elevated above the plane of the others. Bill various, mostly flattened.

Mr. Sclater (partly following Huxley and others) has proposed a system of classification which has met with much acceptance, and is based partly on external, partly on internal features. Regarding the class Aves as divided into two subclasses, *Carin tia* and *Ratilia*, the former containing all birds that have a prominent keel on the sternum (Lat. *carina*), the latter having the sternum flat and raft-like (Lat. *ratis*, a raft), he divides the former into 23 and the latter into 3 orders, thus:—

CARINATE.—1. PASSERES, with four suborders (including more than half of all known birds, and substantially corresponding with the older order Passers, or Insessores). 2. PIC-ARLE, with six sub-orders (woodpeckers, swifts, goat-suckers, trogons, toucans, cuckoos, etc.) 3. PSITACCI (parrots). 4. STRIGES (owls). 5. Ac-CIPITRES (eagles, hawks, vultures, and other diurnal birds of prey). 6. STEGANOPODES (pelican, cormorant, gannet, etc.). 7. HERODIONES (herons, storks, bittern, etc.). 8. ODONTOG-LOSSÆ (flamingoes). 9. PALAMEDEÆ (screamers). 10. ANSERES (geese, ducks, swans). 11. COLUMBÆ (pigeons). 12. PTEROCLETES (sand-grouse). 13. GALLINÆ (fowls, partridges,

pheasants, grouse, etc.). 14. OPISTOHOCOMI (includes only one bird, the hoatzin). 15. HEMIFODII (hemipodes, a small group). 16. FULICARIÆ (rails, coots, etc.). 17. ALEC-TORIDES (cranes, bustards, trumpeter). 18. LIMICOLÆ (snipe, woodcock, curlew, plover, etc.). 19. GAVIÆ (gulls). 20. TUBINARES (petrels). 21. PYGOFODES (divers, auks, grebes). 22. IMPENNES (penguins). 23. CNYFURI (tinamous). Sub-class RATITÆ.—24. APTERYGES (apteryx). 25. CASUARII (cassowary and emu). 20. STRUTHIONES (ostrich, rhea).

Birds are not numerous as fossil organisms. Among the most important and interesting bird fossils we at present possess are the two specimens of archæopteryx found in the slatequarries of Solenhofen, Bavaria. This bird differed from all existing birds in the elongated reptilian nature of its tail, which was composed of simple vertebræ, each bearing a single pair of quill-feathers. It had also teeth. They certainly tend to prove the evolution of birds from reptiles. Other two most interesting fossil birds are the ichthyornis and the hesperornis, both found in the cretaceous formation of North America and both provided with teeth; but while the former must have had powerful wings the latter was quite wingless.

**Bird's-eye-l'laple**, curled maple, the wood of the sugar-maple when full of little knotty spots somewhat resembling bird's eyes, much used in cabinet-work.

**Bird's-nest**, a name popularly given to several plants, as, Indian pipe or bird's-nest, a yellowish-white plant, common in woods from Canada to Georgia and west to Illinois.

Birds'-nests, Edible, the nests of the salangane and other species of swifts (or swiftlets) found in the Indian seas. They are particularly abundant in the larger islands of the Eastern Archipelago. The nest has the shape of a common swallow's nest, is found in caves, particularly on the seashore, and has the appearance of fibrous, imperfectly concocted isinglass. When procured before the eggs are laid the nests are of a waxy whiteness and are then esteemed most valuable; when the bird has laid her eggs they are of second quality; when the young are fledged and flown, of third quality. They appear to be composed of a mucilaginous substance secreted by special glands, and not, as was formerly thought, made from a glutinous marine fucus or seaweed. The Chinese consider the nests as a great stimulant and tonic, and it is said that about  $8\frac{1}{2}$  millions of them are annually imported into Canton.

Birds of Passage, birds which migrate with the season from a colder to a warmer, or from a warmer to a colder climate, divided into summer birds of passage and winter birds of passage. Such birds always breed in the country to which they resort in summer; l. e., in the colder of their homes. In America the robin is a familiar example.

Bi'ren (or Bi'ron), ERNEST JOHN VON (1687-1772), duke of Courland. He gained the favor of Anna, duchess of Courland and niece of Peter the Great of Russia, and when she ascended the Russian throne (1730) Biren was loaded by her with honors, and introduced at the Russian court. He was made duke of Courland in 1737, and continued a powerful favorite during her reign, freely indulging his hatred against the rivals of his ambition. On the death of Anna he became regent, but he was exiled to Siberia in 1741. On the accession of Elizabeth to the throne she permitted his return to Russia, and in 1763 the duchy of Courland was restored to him.

**Bir'kenhead**, a town of England, in Cheshire, on the estuary of the Mersey, opposite Liverpool. It has commodious docks with a lineal quay space of over nine miles, and a complete system of railway communication for the shipment of goods and direct coaling of steamers. The principal industries are ship-building and engineering. Its commerce is in all respects a branch of that of Liverpool. The communication with Liverpool is by large steamboats and by a railway tunnel under the bed of the Mersey 44 miles long including the approaches, 21 feet high, 26 feet wide, the roof being about 30 feet below the bed of the river; cost \$6,250,000. Pop. 99,857.

**Birmingham**, Jefferson co., Ala., and the most important seat of the iron industry in the South, is 95 mi. n.n.w. of Montgomery, with foundries, mills, factories, and machine shops; iron has developed its growth from 3,000 in 1880 to 26,178 in 1890. Its property is over \$35,000,000.

**Bir' mingham**, a great manufacturing city of England, in the county of Warwick, 112 mi. n.w. of London, and 97 s.e. of Liverpool. It is the principal seat of the hardware manufacture in Britain, producing metal articles of all kinds from pins to steam engines. It manufactures fire-arms in great quantities, swords, jewelry, buttons, tools, steel pens, locks, lamps, bedsteads, gas-fittings, sewing machines, articles of papier-maché, railway carriages, etc. The quantity of solid gold and silver plate manufactured is large, and the consumption of these metals in electroplating is very great. Japanning, glass manufacturing, and glassstaining or painting form important branches of industry, as also does the manufacture of chemicals. Pop. 478,113.

**Bir' nam,** a hill in Perthshire, Scotland, 1,324 feet high, once covered by the royal forest immortalized by Shakespeare in Macbeth.

**Birs Nimrud**, a famous mound in Babylonia, on the west side of the Euphrates, 6 mi. s.w. of Hillah, generally identified as the remains of the Tower of Babel.

**Bis'cay**, a province of Spain near its n.e. corner, one of the three Basque provinces (the other two being Alava and Guipuzcoa); area 850 sq. mi.; pop. 235,659. The surface is generally mountainous; the most important mineral is iron, which is extensively worked; capital, Bilbao.

**Biscay**, Bay of, that part of the Atlantic which lies between the projecting coasts of France and Spain, extending from Ushant to Cape Finisterre, celebrated for its dangerous navigation.

Biscuit (bis'ket) (Fr. "twice baked"), a kind of hard, dry bread which is not liable to spoil when kept. Biscuits are either fermented or unfermented, the kinds in ordinary use being generally fermented, while the unfermented biscuit is much used at sea, and hence called sea-biscuit. More than a hundred different sorts of biscuit are manufactured, and owing to the immense demand manual labor has long since been superseded in the larger works by machinery. In making sea-biscuit the flour is mixed with water, converted into dough by a revolving shaft armed with knives, kneaded with rollers, cut, stamped, conveyed on a framework drawn by chains through an oven open at both ends, and thence passed to a drying room—all without being touched by hand. Two thousand lbs. weight of biscuits can thus be turned out of a single oven in a day of 10 hours. In many fancy biscuits the process is of course more elaborate, but even in these, machinery plays an important part. Sea-biscuit should continue sound for 18 months or two years; its nutritive properties are to those of bread as 18 to 24. Meat biscuits are made of flour mixed with the soluble elements of meat. The popular American name for most varieties of biscuits is crackers.

**Biscuit**, in pottery a term applied to porcelain and other earthenware after the first firing and before glazing. At this stage it is porous and used for wine-coolers, etc.

**Bishop,** SIR HENRY ROWLEY (1780-1855), English musical composer. From 1800, when his first opera, *The Circassian Bride*, was produced at Drury Lane, until his masque, *The Fortunate Isles*, written to celebrate Queen Victoria's marriage, he composed about a hundred works for the stage.

**Bis'kara** (or Biskra), a town, Algeria, the chief military post of the Sahara, with an important caravanserai. Pop. 8,000.

Bismarck, capital of North Dakota. Pop. 2,260.

**Bismarck Archipelago**, the name given by the Germans to New Britain, New Ireland, and other islands adjoining their portion of New Guinea.

Bismarck-Schönhausen (bis' märk-sheun'hou-zén), OTTO EDUARD LEOPOLD, Prince, one of the greatest statesmen of the nineteenth century; b. of a noble family of the "Mark' (Brandenburg), at Schönhausen, April 1, 1815; studied at Göttingen, Berlin, and Greifswald; entered the army and became lieutenant in the Landwehr. After a brief interval devoted to his estates and to the office of inspector of dikes, he became in 1846 a member of the provincial diet of Saxony, and in 1847 of the Prussian diet. In 1851 he was appointed representative of Prussia in the diet of the German Federation at Frankfort, where with brief interruptions he remained till 1859, exhibiting the highest ability in his efforts to checkmate Austria and place Prussia at the head of the German states. From 1859-62 he was am bassador at St. Petersburg, and in the latter year, after an embassy to Paris of five months' duration, was appointed first minister of the Prussian crown. The Lower House persistently refusing to pass the bill for the reorganization of the army. Bismarck at once dissolved it (October, 1862), closing it for four successive sessions until the work of reorganization was complete. When popular feeling had reached its most strained point, the Schleswig-Holstein question acted as a diversion, and Bismarckby the skillful manner in which he added the duchies to Prussian territory, checkmated Austria, and excluded her from the new German confederation, in which Prussia held the first place—became the most popular man in Germany. As chancellor and president of the Federal Council he secured the neutralization Luxemburg in place of its cession by ദ് Holland to France; and though in 1868 he withdrew for a few months into private life he resumed office before the close of the year. A struggle between Germany and France appearing to be sooner or later inevitable, Bismarck, having made full preparations, brought matters to a head on the question of the Hohenzollern candidature for the Spanish throne. Having carried the war to a successful issue, he became chancellor and prince of the new German empire. Subsequently, in 1872, he alienated the Roman Catholic party by promoting adverse legal measures and expelling the Jesuits. He then resigned his presidency for a year, though still continuing to advise the Toward the close of 1873 he reemperor. turned to power, retaining his position until, in March, 1890, he disagreed with the emperor and tendered his resignation. In 1878 he presided at the Berlin Congress, in 1880 at the Berlin Conference, and in 1884 at the Congo or Colonial Conference. He retired from the chancellorship in 1890, and since has been attending to his private affairs. In March, 1895, Emperor William II visited him on the occasion of the grand celebration of the old "Iron Chancellor's" eightieth birthday.

**Bis'muth**, a metal of a yellowish or reddish-white color, and a lamellar texture. It is somewhat harder than lead and not malleable, when cold being so brittle as to break easily under the hammer, so as to be reducible to powder. Its internal face or fracture exhibits large shining plates variously disposed. It fuses at 476 F., and expands considerably as it hardens. It is often found in a native state,



crystallized in rhombs or octahedrons. or in the form of dendrites. or thin laminæ investing the ores of other metals. particularly

Native Bismuth and Crystal.

cobalt. Bismuth is used in the composition of pewter, in the fabrication of printers' types, and in various other metallic mixtures. Eight parts of bismuth, 5 of lead, and 3 of tin, constitute the fusible metal sometimes called Newton's, from the discoverer, which melts at 2029 F., and may be fused over a candle in a piece of stiff paper without burning the paper. It forms the basis of a sympathetic ink; and a derivative from it is used in medicine. A special feature of interest is its diamagnetic property. The subnitrate or basic nitrate of bismuth is used as a paint and as a cosmetic, and is known as *Pearl White* or *Pearl Powder*.

Bi'son, the name applied to two species of One of these, the European bison or OX. aurochs is now nearly extinct, being found only in the forests of Lithuania and the Cau-The other, or American bison, imcasus. properly termed buffalo, was found only in the region lying north and south between the Great Slave Lake and the Yellowstone River, and in parts of Kansas and Texas, and has almost become extinct in the wild state, though formerly to be met with in immense herds. The two species closely resemble each other, the American bison, however, being for the most part smaller, and with shorter and weaker hind quarters. The bison is remarkable for the great hump or projection over its fore shoulders, at which point the adult male is almost six feet in height; and for the long, shaggy, rust-colored hair over the head, neck, and forepart of the body. In summer, from the shoulders backward, the surface is covered with a very short fine hair, smooth and soft as velvet. The tail is short and tufted at



American Bison.

the end. The American bison used to be much hunted for sport as well as for its flesh and skin. Its flesh is rather coarser grained than that of the domestic ox, but was considered by hunters and travelers as superior in tenderness and flavor. The hump is highly celebrated for its richness and delicacy. Their skins, especially that of the cow, dressed in the Indian fashion, with the hair on, make admirable defenses against the cold, and are known as buffalo robes; the wool has been manufactured into hats and a coarse cloth. The American bison has been found to breed readily with the common ox, the issue being fertile among themselves. The construction of the transcontinental railroads and the great extent to which they have been hunted has caused the almost complete extinction of the bison. Today the farmer plows where twenty years ago a million buffaloes wallowed. A few herds are in private possession and a herd is preserved in the Yellowstone National Park.

**Bisque** (bisk), a kind of unglazed white porcelain used for statuettes and ornaments.

**Bissell**, WILLIAM H. (1811-1860), b. near Cooperstown, N. Y., d. at Springfield, Ill. He practised medicine and afterward law. was a member of the legislature of Illinois in 1840, served in the Mexican War, and took a prominent part in the battle of Buena Vista. He served in Congress as an independent Democrat, 1849-55, but left the Democratic party over the Kansas-Nebraska bill, and was elected governor of Illinois as a Republican in 1856. He was reëlected but d. before his term expired. Jefferson Davis at one time challenged Bissell, but when the latter promptly accepted and named muskets at short range as the weapons, Mr. Davis backed down.

**Bissell**, WILLIAM S., American statesman, b. in Rome, N. Y., 1847, graduated at Yale College, 1869. He was Grover Cleveland's law partner when the latter became mayor of Buffalo. His reputation is that of a railroad attorney. President Cleveland appointed him postmaster general in 1893. He resigned in 1895.

**Bistre** (or bister), a warm brown pigment, a burned oil extracted from the soot of wood, especially beech. It furnishes a fine transparent wash, but is chiefly employed in the same fashion as sepia and Indian ink for monochrome sketches.

Bit, the part of a bridle which goes into the mouth of a horse, and to which the reins are attached. Also one of the movable boring tools used by means of the carpenter's brace. There is a great variety of forms, to which special names are given.

**Bithoor** (*bit-hör'*) (Bithur or Bittoor), a town, India, n.w. provinces, 12 mi. n.w. of Cawnpore, on the Ganges, long the abode of a line of Mahratta chiefs, the last of whom died without issue in 1851. His adopted son, Nana Sahib, who claimed the succession, was the instigator of the massacre at Cawnpore. Pop. 6,685.

Bithyn ia, an ancient territory in the n.w. of Asia Minor, on the Black Sea and Sea of Marmora, at one time an independent kingdom, latterly a Roman province. The cities of Chalcedon, Heraclea, Nicomedia, Nicæa, and Prusa were in Bithynia. In the eleventh century it was conquered by the Seljuks, and in 1298 a new kingdom was founded there by the Ottoman Turks, of which, prior to the capture of Constantinople, Prusa (Broussa) was the capital.

**Biton** to, a town, Italy, province of Bari, the seat of a bishop, with a handsome cathedral. The environs produce excellent wine. Pop. 27,060. Here, in 1734, the Spaniards won a victory over the Austrians which deeided the fate of Naples.

Bitter-ash, a tree, native of the West Indies, the bark of which is used as a tonic. Others of the same genus have also the same name, a species of Jamaica having wood almost as bitter as quassia, and being called Jamaica quassia.

Bitter-gourd, a plant, called also Colocynth. Bitter-king, a tree of the quassia order pe-

# Bittern

culiar to the Moluccas and Fiji Islands, the root and bark of which, bruised and macerated, are used in the East as an emetic and tonic.

Bit'tern, the name of several wading birds of the heron family. The common bittern is about 28 in. in length, about 44 in extent of wing; general color, dull yellowish-brown, with spots and bars of black or dark brown; feathers on the breast long and loose: tail short, bill about 4 in. long. It is remarkable for its curious booming or bellowing cry, from which come the provincial names of miredrum and butterbump, etc. The eggs (greenish-brown) are four or flve in number. The little bittern is not more than 15 in. in length. The American bittern has some resemblance to the common European bittern, but is smaller.



The Common Bittern.

**Bittern**, the syrupy residue from evaporated sea water after the common salt has been taken out of it. It is used in the preparation of Epsom salt (sulphate of magnesia), of Glauber's salt (sulphate of soda), and contains also chloride of magnesium, iodine, and bromine.

chloride of magnesium, iodine, and bromine. Bitter-nut, a tree of North America, of the walnut order, the swamp hickory, which produces small and somewhat egg-shaped fruits, with a thin, fleshy rind; the kernel is bitter and uneatable.

**Bitter-root**, a plant of Canada and part of the U. S., so called from its root being bitter though edible, and indeed esteemed as an article of food by whites as well as Indians. From the root, which is long, fleshy, and tapering, grow clusters of succulent green leaves, with a fleshy stalk bearing a solitary rose-colored flower rising in the center, and remaining open only in sunshine. Flower and leaves together, the plant appears above ground for only about six weeks. Californian bitter-root and Natal bitter-root both belong to the gourd family. Bitters, a liquor (frequently spirituous) in which bitter herbs or roots have been steeped. Gentian, quassia, angelica, bog bean, chamomile, hops, centaury, etc., are all used for preparations of this kind. The well-known Angostura bitters have aromatic as well as bitter properties. Bitters are employed as stomachics, anthelmintics, etc.

**Bitter-spar** (rhomb-spar), the crystallized form of dolomite or magnesian limestone.

**Bitter-wood**, the timber of two trees noted for the extreme bitterness of the wood. The name is also given to other bitter trees, as the bitter-ash.

Bitu'men, a mineral substance of a resinous nature, composed principally of hydrogen and carbon, and appearing in a variety of forms which pass into each other and are known by different names, from naphtha, the most fluid, to petroleum and mineral tar, which are less so, thence to maltha or mineral pitch, which is more or less cohesive, and lastly to asphaltum and elastic bitumen (or elaterite), which are solid. It burns like pitch, with much smoke and flame. It consists of 84 to 88 of carbon and 12 to 16 of hydrogen, and is found in the earth, occurring principally in the secondary, tertiary, and alluvial forma-tions. It is a very widely spread mineral, and is now largely employed in various ways. As the binding substance in mastics and cements it is used for making roofs, arches, walls, cellar-floors, etc., water-tight, for street and other pavements, and in some of its forms for fuel and for illuminating purposes. The bricks of which the walls of Babylon were built are said to have been cemented with bitumen, which gave them unusual solidity.

**Bituminous Shale** (or Schist), an argillaceous shale impregnated with bitumen and very common in the coal measures. It is largely worked for the production of paraffin, etc.

Bi'valves, molluscous animals having a shell consisting of two halves or valves that open by an elastic hinge and are closed by muscles; as the oyster, clam, mussel, cockle. etc.



Longitudinal Section through a Fresh-water Mussel.

a, edge of mantle; b, foot, with position of ganglion indicated; c, gills: d, mouth; c, tentacles or palps; f, posterior adductor muscle; g, anterior adductor; h, head-ganglion; f, ventricle of heart; f, auricle of heart; k, rectum; l, kidney; m, exhalent aperture; n, inhalent aperture.

Bivouac



Several Forms of Bivalves.

**A.** Avicula; **B.** Pectunculus, with extended foot (a); C. Venus, with respiratory siphons (a, b) and extended foot (c); D. Mya truncata, showing respiratory siphons (a, b) and foot (c).

**Bivouac** (biv'u-ak), the encampment of soldiers in the open air without tents, each remaining dressed and with his weapons at hand. It was the regular practise of the French revolutionary armies, but is only desirable where great celerity of movement is required.

**Bijörnson**, BJÖRNSTJERNE (byeurn'styer-ne byeurn'son), Norwegian novelist, poct, and dramatist, b. 1832. He entered the University of Christiania in 1852, and became known as a contributor of articles and stories to newspapers and as a dramatic critic. From 1857 to 1859 he was manager of the Bergen theater, producing during that time his novel Arne, and his tragedy of Halte Hulda. He was at Christiania part editor of the Aftenblad in 1860 became editor of the Norsk Folkellad. In 1869-72 he was co-director of a Copenhagen periodical, and much of his later life has been passed abroad. Among his tales and novels a number of which may be had in English, are: Synnare Solbakken; Arne; The Fishermaiden; A Happy Boy; Ruilways and Churchyards. Among his dramatic pieces are: The Newly Married Couple; Mary Stuart in Scotland; A Bankruptcy, etc. He has also written poems and songs.

etc. He has also written poems and songs. Black, the negation of all color, the opposite of white. There are several black pigments, such as *icory-black*, made from burned ivory or bones; *lamp-black*, from the smoke of resinous substance; Spanish-black or cork-black, from burned cork, etc.

**Black,** JEREMIAN SULLIVAN (1810-1883), born in Somerset co., Pa. After receiving a good education, Jeremiah studied law, was admitted to the bar in 1831, and made prosecuting attorney of Somerset co. In 1842 he was raised to the bench and made judge of his district, and became chief justice in 1851. In 1857 he was called to the cabinet by President Buchanan as attorney general. He succeeded General Cass as secretary of state in December, 1860, and held this place until the close of Buchanan's administration. He became reporter of the U. S. Supreme Court for a short time, after which he returned to the practise of his profession in York, Pa. He was one of the counsel against President Johnson. Among his noted cases were the Vanderbilt will case, the Milliken case, and the McGarrahan claim. He was a member of the Pennsylvania constitutional convention in 1873.

**Black**, JOSEPH (1728-1799), a distinguished Scotch chemist. In 1756 he was appointed professor of medicine and lecturer on chemistry at Glasgow, and at Edinburgh in 1766. His fame, however, chiefly rests on his theory of "latent heat."

Black, WILLIAM, novelist, b. in Glasgow in 1841. His first novel, Love or Marriage, was moderately successful, but his In Silk Attire, Kilmeny the Monarch of Mincing Lane, and especially A Daughter of Heth, gained him an increasingly wide circle of readers. His later works are The Strange Adventures of a Phaeton, A Princess of Thule, Three Feathers, Green Pastures and Piccadilly, Macleod of Dare, White Wings, The Beautiful Wretch, Judith Shakespeare, The Strange Adventures of a House-Boat, etc.

**Black' bird,** called also the *merle*, a wellknown species of thrush, common in England. It is larger than the common thrush, its length being about 11 inches. The color of the male is a uniform deep black, the bill being an orange-yellow; the female is of a brown color, with blackish-brown bill. The nest is usually in a thick bush, and is built of grass, roots, twigs, etc., strengthened with clay. The eggs,



#### Blackbird.

generally four or five in number, are of a greenish-blue, spotted with various shades of brown. The song is rich, mellow, and flutelike, but of no great variety or compass. Its food is insects, worms, snails, fruits, etc. The blackbirds or crow-blackbirds of America are quite different from the European blackbird, and are more nearly allied to the starlings and crows. The red-winged blackbird, belonging to the starling family, is a familiar American bird that congregates in great flocks.

**Black' burn**, a manufacturing town of England, in the county of Lancaster, 21 mi. n.n.w. from Manchester. Blackburn is one of the chief seats of the cotton manufacture, there being upward of 140 mills as well as works for making cotton machinery and steam engines. The cottons made in the town and

# Blackburn

vicinity have an annual value of about \$25,-000,000. Pop. 120,064.

**Blackburn**, JOSEPH CLAY STYLES, b. in Woodford co., Ky., 1838; practised law in Chicago 1858-60. He entered the Confederate army in 1861, and served through the Civil War. He was elected to the Kentucky legislature 1871 and 1873, and in 1875 entered Congress as a Democrat, was re-elected up to 1882, and in March, 1885, became U. S. senator, which position he held until 1897, when he was succeeded by Deboe.

**Blackcap**, a European bird of the warbler family, 6 in. long, upper part of the head black, upper parts of the body dark gray with a greenish tinge, under parts more or less silvery white. The female has its hood of a dull rust color. The blackcap is met with in



#### Blackcap.

England from April to September. Its nest is built near the ground; the eggs, from five to six, are reddish-brown, mottled with a deeper color. It ranks next to the nightingale for sweetness of song. The American blackcap is a species of titmouse, so called from the coloring of the head.

**Blackfeet Indians**, a tribe of Indians, partly inhabiting the U. S., partly Canada, from the Yellowstone to Hudson's Bay.

**Blackfish** (or tautog), a fish caught on the American coast, especially in the vicinity of Long Island, whence large supplies are obtained for the New York market. Its back and sides are of a bluish or crow black; the under parts, especially in the males, are white. It is plump in appearance, and much esteemed for the table, varying in size from 2 to 12 lbs. Another fish, found in the Mediterranean and on the coasts of Western Europe, is also called blackfish. It belongs to the mackerel family. In Scotland the term is applied to foul or newly-spawned fish. In America two species of small whale also get this name.

**Black Fly**, the name of two flies whose bite is very troublesome to man and beast in the northern states and Canada.

northern states and Canada. Black Forest, a chain of European mountains in Baden and Würtemburg, running almost parallel with the Rhine for about 85 mi. The Danube, Neckar, Kinzig, and other streams rise in the Black Forest, which is rather a chain of elevated plains than of isolated peaks; highest summit, Feldberg, 4,900 feet. The principal mineral is iron, and there are numerous mineral springs. The forests are extensive, chiefly of pines and similar species, and yield much timber. The manufacture of wooden clocks, toys, etc., is the most important industry, employing about 40,000 persons. The inhabitants of the forest are quaint and simple in their habits, and the whole district preserves its old legendary associations.

**Black Gum**, an American tree yielding a close-grained, useful wood; fruit a drupe of blueblack color, whence it seems to get its name of "black"; it has no gum about it. It is called also pepperidge, and has been introduced into Europe as an ornamental tree. Black Hawk (1767-1838), a chief of the Sac

and Fox tribes of Indians, b. in Kaskaskia, Ill., d. on the Des Moines River. He became a trusted brave and a successful chieftain in conducting sorties against the Osage and Cherokee tribes. He was grand-chieftain of the Sacs in 1788. In 1804 the Sacs and Foxes agreed to cede to the U.S. lands extending about 800 miles along the Mississippi River. This contract Black Hawk repudiated, and claimed that the chiefs had been made drunk before they signed the documents. During the War of 1812 Black Hawk, tempted by British agents, joined the enemy with about 500 warriors; but soon retired from British service. In 1823 most of the Sacs and Foxes, under the leadership of Keokuk, removed to their reservation beyond the Mississippi River: but Black Hawk, with part of the tribe, re-fused to emigrate. Early in 1832 Black Hawk, with a band of Indians, crossed the Mississippi River, but, after several encounters, the Indians were defeated, and Black Hawk and his two sons became captives. The three were confined in Fortress Monroe until 1833. Later Black Hawk was succeeded by Keokuk.

**Blackheath**, a village and heath, England, Kent, about 6 mi. s.e. of London Bridge. The *heath* contains about 70 acres within its present limits, and is much resorted to by pleasure partics. It has been the scene of many remarkable events, such as the insurrectionary gatherings of Wat Tyler and Jack Cade, and the exploits of various highwaymen.

**Black Hills, a** hilly region in South Dakota and n.e. Wyoming, rising to the height of 6,700 ft., rich in timber, but especially in gold, as well as other minerals.

**Black Hole of Calcutta**, a small chamber, 20 ft. square, in the old fort of Calcutta, India, in which after their capture by Surajah Dowlah, the whole garrison of 146 men were confined during the night of June 21, 1756. Only twenty-three survived. The spot is now marked by a monument.

**Blackie**, JOHN STUART, Scottish writer, long professor of Greek in the university of Edinburgh; b. at Glasgow in 1809; d. March, 1895. Both in writing and upon the platform his name has been associated with various educational, social, and political movements.

Blacking, for boots and shoes, etc., usually

contains for its principal ingredients oil, vinegar, ivory or bone black, sugar or molasses, strong sulphuric acid, and sometimes caoutchouc and gum-arabic. It is used either as liquid or in the form of paste, the only difference being that in making the paste a portion of the vinegar is withheld.

Black Lead. See Graphite.

**Black-letter**, the name commonly given to the Gothic characters which began to supersede the Roman characters in the writings of Western Europe toward the close of the twelfth century. The first types were in black-letter, but these were gradually modified in Italy until they took the later Roman shape introduced into most European states during the sixteenth century.

**Biackmail**, a certain rate of money, corn, cattle, or the like, anciently paid, in the north of England and in Scotland, to certain men who were allied to robbers, to be protected by them from pillage. It was carried to such an extent as to become the subject of legislation. Blackmail was levied in the districts bordering the Highlands of Scotland till the middle of the eighteenth century. The modern use of the term applies to money extorted from persons under threat of exposure in print for an alleged offense; hush money.

**Blackmore,** RICHARD DODDRIDGE, novelist, b. at Longworth, Berkshire, 1825; educated at Tiverton school and Exeter college, Oxford, where he graduated in 1847. In 1852 he was called to the bar at the Middle Temple, and afterward practised as a conveyancer. His greatest success was Lorna Doone, a Romance of Ermoor. Other novels by him are: Clara Vaughan, Cradock, Nowell, A Tale of the New Forest, The Maid of Sker, Alice Lorraine, a Tale of the South Downs, Cripps the Carrier, Erema, Mary Anerley, Christowell, and Sir Thomas Upmore.

**Black Mountains,** the group which contains the highest summits of the Appalachian system, Clingman's Peak being 6,701 ft.; Guyot's Peak 6,661.

**Black-quarter**, a kind of apoplectic disease which attacks cattle, indicated by lameness of the forefoot, one of the limbs swelling, and after death being suffused with black blood, which also is found throughout the body.

**Black Sea** (ancient Pontus Euxinus), a sea situated between Europe and Asia, and mainly bounded by the Russian and Turkish dominions, being connected with the Mediterranean by the Bosporus, Sea of Marmora, and Dardanelles, and by the Strait of Kertsch with the Sea of Azov, which is, in fact, only a bay of the Black Sea; area of the Black Sea and the Sea of Azov about 175,000 sq. mi, with a depth in the center of more than 150 fathoms and few shoals along its shores. The water is not so clear as that of the Mediterranean, and is less salt on account of the many large rivers which fall into it—the Danube, Dniester, Dnieper, Don, etc. Though not tidal, there are strong currents. The tempests on it are very violent, as the land which confines its agitated waters gives to them a kind of whirling motion, and in the winter it is scarcely navigable. During January and February the shores from Odessa to the Crimea are icebound. It contains few islands, and those of small extent. The most important ports are those of Odessa, Kherson, Eupatoria, Sebastopol, Batum, Trebizond, Samsun, Sinope, and Varna. The fisheries are of some value. After the capture of Constantinople the Turks excluded all but their own ships from the Black Sea until 1774, when, by the Treaty of Kainarji, they ceded to Russia the right also to trade in The same right was accorded to Austria it. in 1784, and by the Peace of Amiens to Britain and France in 1802. The preponderance thereafter gained by Russia was one of the causes of the Crimean War, in which she was compelled to cede her right to keep armed vessels in it, the sea being declared neutral by the Treaty of Paris, 1856. In 1871, however, when France could not attend, owing to the Franco-German War, the sea was deneutralized by a conference of the European powers at London in response to the Russian protest.

**Black-snake**, a common snake in North America, reaching a length of 5 or 6 feet, and so agile and swift as to have been named the *Racer*, with no poison fangs, and therefore comparatively harmless. It feeds on small quadrupeds, birds, and the like, and is especially useful in killing rats.

**Black' stone**, SIR WILLIAM (1723-80), an eminent English jurist. In 1765 he published the first volume of his famous *Commentaries* on the Laws of England, the other three volumes being produced at intervals during the next four years. Its merits as an exposition made it for a long period the principal textbook of English law.

**Blackstone**, Worcester co., Mass., a thriving manufacturing town, 216 mi. s.e. of Worcester: has 7 churches, a bank and public library. Pop. 6,137.

**Black Tin**, tin ore when dressed, stamped, and washed ready for smelting, forming a black powder.

**Biackwell**, ELIZABETH, the first woman who ever obtained the degree of M. D. She was born in England in 1821, and settled in America with her parents in 1831, where from 1838 to 1847 she was engaged in teaching. After numerous difficulties she was admitted into the College of Geneva, N. Y., and graduated M. D. in 1849. She afterward studied in Paris, and commenced practise in New York in 1851, where she has since chiefly resided. In 1854, with her sister Emily, she opened a hospital for women and children in New York.

**Black-wood**, or Indian Rosewood, a leguminous tree of Hindustan the timber of which is highly valued and much used in the manufacture of fine furniture. The Australian Black-wood is of the acacia species.

**Blackwood**, WILLIAM (1776-1834), an Edinburg publisher, b. at Edinburgh. He started as a bookseller in 1804, and soon became also a publisher. The first number of *Blackwood's Magazine* appeared April 1, 1817, and it has always been conducted in the Tory inter-

# Bladder-nut

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est. After his death the business, which has developed into a large publishing concern, was carried on by his sons, and the magazine still keeps its place among the leading periodicals.

**Bladder-nut**, a name of shrubs or small trees, natives of Europe, Asia, and North



Bladder-nut. a.-Flower. b.-Fruit.

America, the fruits of which consist of an inflated bladdery capsule containing the seeds.

**Bladderwort,** the common name of slender aquatic plants, species of which are natives of Britain, the U. S., etc., growing in ditchesand pools. They are named from having little bladders or vesicles, that fill with air at the time of flowering and raise the plant in the water, so that the blossoms expand above the surface.

**Biadensburg**, a town of Maryland, 6 mi. n.e. of Washington, D. C. It was the scene of a battle Aug. 24, 1814, where the vastly superior British invaders, under General Ross, defeated a force of American militia.

**Bladud'**, in legendary British history, the father of King Lear. He is said to have been the founder of the city of Bath, having been cured of his leprosy by its medicinal waters.

**Blacu** (Blacuw, or Blauw) (blä'u), a Dutch family celebrated as publishers of maps and books. William (1571-1638) established the business at Amsterdam, constructed celestial and terrestrial globes, and published some excellent works. His son John (d. 1673) published various topographical plates and views of towns. The works of this family are still highly valued.

**Blaine**, JAMES GILLESPIE (1830-1893), statesman, was b. at West Brownsville, Washington co., Pa. His father, Ephraim L., was a descendant of the old Scotch Covenanters and a rigid Presbyterian. His mother, Maria Gillespie, was of Irish and Scottish ancestry and a member of the Catholic church. Blaine was educated at Washington college, from which he graduated in 1847, being only seventeen years of age. He left college self-depend-ent, went to Blue Lick Springs, Ky., and entered the profession of teacher. In 1850 his father died. In 1851 at Pittsburg, Pa., he was married to Miss Harriet Stanwood, of Augusta, Me., a descendant of the Puritan stock. In 1852 he went to Philadelphia, where he taught in an asylum for the blind for two years. In 1854 he moved to Augusta, Me., and entered editorial work on the Kennebeo Journal, a weekly newspaper. From the Kennebec Jour-nal he took a more influential position on the Portland Daily Advertiser. In the fall election of 1858 he was elected to the state legislature where, by his speech-making, he attracted national attention. He served in the state legislature until 1862. In 1863 Blaine took his seat in the House of Representatives and thenceforward was a national man. In 1865 he visited Europe for his health. He was made speaker of the House in 1869, which position he held until 1874. While in Congress he made a number of important speeches on financial and taxation questions and participated in many celebrated debates. In 1876 he was second in his candidature for presidential nomination by the Republican Na-tional Convention. About this time he was accused of speculating in railroad bonds. The charge was agitated by his political opponents and undoubtedly caused his defeat. He was again unsuccessful in his candidature in 1880, and James A. Garfield was elected president. Blaine was made secretary of state by Gar-field. After the death of Garfield Blaine resigned and began his *Twenty Years in Con*gress, a work which has had a most favorable reception. In 1884 he was nominated for president, but was defeated by Cleveland. When Harrison was elected president he was made secretary of state for the second time. He resigned from Harrison's cabinet and became a candidate for the nomination of president in 1892, but was defeated in the convention. Blaine was for many years the recognized leader of the Republican party, and was a great exponent of the doctrine of reciprocity. He was prominent in the seal-fisheries dispute, the reorganization of the Brazilian republic, and in many other questions of national importance. Though a private citizen at the time of his death he was mourned by the whole nation.

**Blair,** FRANCIS PRESTON (1791-1876), American statesman, b. in Virginia. Originally a Whig, he became editor of the Washington *Glube*, the organ of Jacksonian Democracy 1829-45, and in 1856 was active in the organization of the Republican party, and presided over the Pittsburg convention which nominated Fremont. He was a leader in the Chicago convention of 1860, which nominated Lincoln. He endeavored to effect a peace with Jefferson Davis in 1864, but was unsuccessful. He opposed the reconstruction measures after Lincoln's death, and became a Democrat.

**Blair**, FRANCIS PRESTON (1821-1875), son of the foregoing, b. in Lexington, Ky. He served in the Mexican War, edited the Missouri

Democrat, and sat in the legislature of Missouri 1852-56. In 1856 he joined the Republican party, and was elected to Congress. He was reclected in 1860 and 1862. He entered the volunteer army as a colonel, became majorgeneral 1862, and resigned his seat in Congress in 1863. He commanded a division at Vicksburg, fought at Lookout Mountain and Missionary Ridge, and marched with Sherman to the sea. He returned to the Democratic party. In 1868 he was on the presidential ticket with Horatio Seymour. In 1871 he reentered the state legislature, and was elected to fill a vacancy in the U. S. Senate. In 1873 he became state superintendent of insurance.

Blair, HENRY WILLIAM, b. in New Hampshire, 1834, served in the Civil War, and from 1866 to 1868, in the state house of representatives and senate. He was in Congress from 1875 to 1879, became U. S. senator 1879, and was retlected in 1885. He is a strong advocate of prohibition and female suffrage. Mr. Blair in 1892 was elected to the fifty-third Congress.

Blair, JOHN INSLEY, b. in New Jersey 1802; organized the Lackawanna Coal and Iron Company, built the Delaware, Lackawanna & Western railroad, organized the railroad system of Iowa, and constructed 2,000 mi. of railroad in that state and Nebraska. He was one of the original directors of the Union Pacific. Mr. Blair was a Republican. He has given more than \$500,000 for schools and churches.

**Blair**, MONTGOMERY (1813-1883), son of Francis P. Blair, Sr., b. in Kentucky. He graduated at West Point in 1835, and served in the Seminole War. In 1839 he became U. S. district-attorney, and in 1842 mayor of St. Louis. He held various judicial offices in Missouri, and after 1852 in Maryland. He was of counsel for the plaintiff in the Dred Scott case. From March, 1861, to September 23, he was postmaster-general, but afterward became a Democrat.

**Biake,** EDWARD, Canadian lawyer and statesman, b. in 1833. He graduated from University College in 1857. In 1867 he became a member of the Canadian Parliament, and leader of the Liberal opposition. In 1871 he became premier of the Ontario legislature. In 1873 he became a member of the Canadian cabinet. Mr. Blake was chosen leader of the liberal party in place of Mr. Mackenzie (1880). He was one of the ablest speakers in the Dominion, and going to England was elected as a member of Parliament for an Irish constituency as a pronounced Home Rule candidate.

**Blake,** ROBERT (1599-1657), a celebrated British admiral, was b. at Bridgewater. He soon distinguished himself as a soldier in the Civil War, and in 1649 was sent to command the fleet with Colonels Deane and Popham. His greatest achievements were in the Dutch war which broke out in 1652. In November, 1654, he was sent with a strong fleet to enforce a due respect to the British flag in the Mediterranean.

Blanc, MONT. See Mont Blanc.

Blanchard (blan-shar), FRANÇOIS (1753-1809),

French aëronaut. In 1785 he crossed the English Channel in a balloon, for which feat he received a pension from the French king. He made many remarkable ascents in various parts of the world. His wife, b. 1778, was his companion in many of his voyages, and was killed by her balloon taking fire, 1819.

**Blanc-mange** (ble-mänzh'), in cookery, a name of different preparations of the consistency of a jelly, variously composed of dissolved isinglass, arrow-root, maize-flour, etc., with milk and flavoring substances.

**Bland,** RICHARD P., an American public man, b. near Hartford, Ky., Aug. 19, 1835; practised law in California and Nevada; has been member of Congress from Missouri since 1874. He was the author of the Bland silver bill, passed in 1878; and an advocate of free coinage of silver and of tariff reform.

**Blank Verse**, verse without rhyme, first introduced into English poetry (from the Italian) by the Earl of Surrey, who was beheaded in 1547. The most common form of English blank verse is the decasyllabic, such as that of Milton's *Paradise Lost*, or of the dramas of Shakespeare. From Shakespeare's time it has been the kind of verse almost universally used by dramatic writers, who often employ an additional syllable, making the lines not strictly decasyllabic. The first use of the term blank verse is said to be in Hamlet, ii. 2: "The lady shall say her mind freely, or the blank verse shall halt for't." The term is not applied to the Anglo-Saxon and early English alliterative unrhymed verse.

**Blanqui**, LOUIS AUGUSTE (1805–1881), b. at Nice. He took part in scores of political plots and insurrections under Louis Philippe, and was condemned to death several times. He returned to France in 1870, participated in the communist revolt, was elected to the chamber, and antagonized the republic as he had the monarchy and the empire.

**Blantyre** (-tir'), a populous mining parish in Lanarkshire, Scotland, containing several villages, at one of which Dr. Livingstone was b. Pop. 9,760. This parish has given its name to an African mission station founded in 1876 by the Established church of Scotland, on the heights which rise between the Upper Shiré River and Lake Shirwa, now the center of settlement and trade.

**Blap' sidæ**, a family of nocturnal black beetles, whose wings are generally obsolete and their elytra soldered together. They frequent gloomy, damp places, and when seized discharge, in self-defense, a liquid of a peculiar penetrating odor.

**Blar' ney**, a village, Ireland, four mi. n.w. of the city of Cork, with Blarney Castle in its vicinity. A stone called the *Blarney Stone*, near the top of the castle, is said to confer on those who kiss it the peculiar kind of persuasive eloquence alleged to be characteristic of the natives of Ireland. The "groves of Blarney" are extensive and interesting, and beneath the castle there are also some curious natural caves.

Blast-furnace, the name given to the common smelting-furnace used for obtaining iron

#### **Blast-furnace**

from its ores with the aid of a powerful blast This air-blast, which is propelled by a of air. powerful blowing-engine and is now invariably heated to a high temperature (600° to 900° F.) is injected by pipes called tuyeres, situated in the lowest part of the furnace, near to the hearth. The conical part next above the hearth is termed the boshes, and the interior is continued upward, sometimes in a tapered body or cone, sometimes as a perpendicular cylinder, which is surmounted by an opening for the introduction of the materials from an external gallery. The exterior consists of massive masonry of stone or firebrick, the body part being lined with two shells of firebricks separated by a thin space to allow for expansion, this space being generally filled with sand, ground fire-clay, or the like, to hinder the radiation of heat to the outside. When the body rises in the form of a perpen-dicular cylinder it is called the barrel. The cone or barrel is sometimes clasped round on the outside by numerous strong iron hoops, or is cased with iron plates fastened to the ma-sonry by iron bolts. The boshes are lined with firebrick or firestone, and the hearth is built with large blocks of refractory stone. The charging of the furnace goes on all day and night, one charge consisting of a bar-row-load of coal and a barrow-load of ore, char, and lime, the last mineral acting as a flux. These charges are constantly passing downward and undergoing a change as they come nearer the hotter parts of the furnace. Toward the lower part the earthy matter of the ore unites with the limestone and forms a slag, which finally escapes at an opening below the tuyeres, and the molten metal drops down and fills the lower part, to be drawn off at stated periods. This is done usually twice in the twenty-four hours by means of a round hole called a tap. The furnace is constantly kept filled to within about 2 feet of the top. The ore

of the top. The ore put in at the top takes about thirty-six hours before it comes out as iron. Hematite yields on an average about 55 per cent. of metal. and blackband about 40 to 50. In the newer forms of furnaces the top is closed, and the gases formerly burned at the top are conveyed by pipes to be utilized as fuel in heating the blast fuel in heating the blast

the blowing-engine. The principle adopted is to close the top by a bell-and-cone arrangement, which is opened and shut at pleasure by hydraulic or other machinery. The height of furnaces varies from 50 to 80, and even in some cases to upward of 100 feet, and the greatest width is about one third of this.

On the Egyptian tombs at Thebes metalworkers are represented as using the blow-pipe

# Blasting

more than 2,000 years before Christ, and Indian and other Oriental workers in metals still use a primitive bellows for this purpose, which was the germ of the blast furnace. Roman historians say that iron was employed by the Britons in manufacturing spears and lances, which re-quired some sort of blast. The Romans themselves, when they occupied Britain, employed iron to a considerable extent, as is evidenced by cinder heaps in the Forest of Dean, in Gloucestershire, and elsewhere. But so rude was their process, that those heaps in the Forest of Dean furnished the chief supply of ore for twenty furnaces during 200 or 300 years. The English iron founders who employed these remains melted them in furnaces of a simple form, called "air-bloomeries," which they erected on the tops of hills, in order to obtain the greatest possible blast of wind.

Blasting, the operation of breaking up masses of stone or rock in situ by means of gunpowder or other explosive. In ordinary operations holes are bored into the rock of from 1 to 6 inches in diameter, by means of a steelpointed drill, by striking it with hammers, or allowing it to fall from a height. After the hole is bored to the requisite depth it is cleaned out, the explosive is introduced, the hole is "tamped" or filled up with broken stone, clay. or sand, and the charge exploded by means of a fuse or by electricity. In larger operations. mines or shafts of considerable diameter take the place of the holes above described. Shafts are sunk from the tops of the rock to various depths, sometimes upward of 60 feet. This shaft joins a heading, or gallery, driven in from the face, if possible, along a natural joint; and from this point other galleries are driven some distance in various directions, with headings at intervals, returning toward the face of the rock and terminating in chambers for the charges. Enormous charges are frequently made use of, upward of twenty tons of gun-



Section of Hell Gate Tunnels.

powder having been fired in a single blast. One of the greatest blasting operations ever attempted was the removal of the reefs in the East River, near New York, known as Hell Gate. An entrance shaft was sunk on the Long Island shore, from which the reef projected. From this shaft nearly twenty tunnels were bored in all directions, extending from 200 to 240 feet, and connected by lateral gal-

leries. Upward of 52,000 lbs. of dynamite, rend-rock, and powder were used, and millions of tons of rock were dislodged. Numerous important improvements have been made in blasting by the substitution of rock-boring machines for hand labor. Of such machines, in which the "jumper" or drill is repeatedly driven against the rock by compressed air or steam, being also made to rotate slightly at each blow, there are many varieties.

**Blatchford**, SAMUEL, b. in New York, 1820; graduated at Columbia in 1837, and was admitted to the bar in 1842. He was law partner with William H. Seward, in 1867 became U.S. district judge for southern New York, and in 1882, associate justice of the U.S. Supreme Court.

**Blat'tidæ**, a family of insects of the order Orthoptera. They are extremely voracious, some species apparently eating almost everything that comes in their way. The type of the family is the well-known cockroach.

Bleaching, the act or art of freeing textile fibers and fabrics and various other substances (such as materials for paper, ivory, wax, oils) from their natural color, and rendering them perfectly white, or nearly so. The ancient method of bleaching by exposing the fabrics, etc., to the action of the sun's rays, and frequently wetting them, has been nearly superseded, at least where the business is carried on on the large scale, more complicated processes in connection with powerful chemical preparations being now employed. Among the latter the chief are chlorine and sulphurous acid, the latter being employed more especially in the case of animal fibers (silk and wool), while cotton, flax, and other vegetable fibers are operated upon with chlorine, the bleaching in both cases being preceded by certain clean-ing processes. The use of chlorine as a bleaching agent was first proposed by Berthollet in 1786, and shortly afterward introduced into Great Britain, where it was first used simply dissolved in water, afterward dissolved in alkali, and then in the form of bleachingpowder, commonly called chloride of lime, the manufacture of which was patented by Mr. Tennant of St. Rollox, Glasgow, in 1799. In modern calico bleaching the preliminary process is singeing by passing the fabric over red-hot plates or through a gas-flame to remove the downy pile and short threads from the surface of the cloth. The goods next pass to the *liming* process, when they are uniformly and thoroughly impregnated with a supersaturated solution of lime. The next process is the bouking or boiling for several hours, after which they are washed. They are then soured by being passed through a solution of hydrochloric acid for the purpose of dissolving any traces of free lime which may have been left in the washing, and to decompose the calcareous soap formed by the bowking process. After boiling in kiers with a solution of sodaash and rosin and another washing, the cloth is ready for the processes of chemicking or liquoring with bleaching-powder, and whitesouring with a very dilute sulphuric acid.

Another thorough washing concludes the operations of bleaching proper, after which the cloth goes through various finishing processes. Modifications of the same processes are adopted in bleaching linen, wool, silk, etc.

**Blende** (blend), an ore of zinc, called also *Mock-lead, False Galena*, and *Black-jack.* Its color is mostly yellow, brown, and black. There are several varieties, but in general this ore contains more than half its weight of zinc, about one fourth sulphur, and usually a small portion of iron. It is a native sulphide of zinc.

Blennerhassett, HARMAN (1764-1831), one of Aaron Burr's victims, b. in Hampshire, England. In 1797 he sailed for New York City. A year later, Blennerhassett purchased Backus Island, in the Ohio River, which thereafter became known by his name. In 1805 Aaron Burr, on his way down the Ohio and Mississippi Rivers, visited him, and succeeded in interesting Blennerhassett in his schemes. He advocated the plans of Burr, and contributed considerable money for boats, arms, provisions, etc. After President Jefferson issued a proclamation against the scheme, Blenner-hassett, fearing arrest, left the island to join Burr at the mouth of the Cumberland River. His island was overrun by a party of militia. Blennerhassett was arrested and imprisoned. From Lexington, Ky., he was taken to Rich-mond, Va., for trial but was discharged in 1807. He then went to Natchez. Miss., where he bought cotton lands near Port Gibson, Miss. This venture proved unsuccessful. In 1819 he removed to Montreal, where he vainly endeavored to acquire a legal practise. In 1822 he sailed for Ireland, where he retired into obscurity on the island of Guernsey, where he d.

**Blenheim**, a village in Bavaria on the Danube. Near it was fought Aug. 13, 1704, during the War of the Spanish Succession the famous battle of Blenheim, in which the allied forces of England and Germany gained a victory over the French and Bavarians. The residence of the dukes of Mariborough at Woodstock, Oxfordshire, was named from this victory. The estate of Woodstock, which belonged to the crown having been conferred by Queen Anne on the great commander, Parliament granted a perpetual pension of \$20,000 a year, and \$2,-500,000 to erect a suitable family seat. The present Duke of Mariborough, Count of Blenheim, is married to Consuelo, daughter of W. H. Vanderbilt, of New York.

Blenheim Dog, a variety of spaniel, bearing a close resemblance to the King Charles breed, but somewhat smaller, so named from having been bred by one of the dukes of Marlborough. It has a short muzzle, long silky hair without any curl, and long pendulous ears.

**Blesbok**, an antelope of South Africa with a white marked face, a general purplish-chocolate color, and a "saddle" of a bluish color; found in great numbers in the Transvaal and Orange Free State, and much hunted.

**Bligh** (bll), WILLIAM (1753-1817), the commander of the ship *Bounty*, when the crew mutinied in the South Seas and carried her off. He was b. at Plymouth, d. at London. The Bounty had been fitted out for the purpose of procuring plants of the bread-fruit tree, and introducing these into the West Indies. Bligh left Tahiti in 1789, and was proceeding on his voyage for Jamaica when he was seized, and, with eighteen men supposed to be well affected to him, forced into the launch, sparingly provisioned, and cast adrift not far from the island of Tofoa. By admirable skill and perseverance they managed to reach the island of Timor in forty-one days. Bligh, with twelve of his companions, arrived in England in 1790, while the mutineers settled on Pitcairn Island, where their descendants still exist. Bligh became governor of New South Wales in 1806, but was shortly deposed and sent back to England. He afterward rose to the rank of admiral

**Blight**, a generic name commonly applied to denote the effects of disease or any other circumstance which causes plants to wither or decay. It has been vaguely applied to almost every disease of plants whether caused by the condition of the atmosphere or of the soil, the attacks of insects, parasitic fungi, etc. The term is frequently limited to disease in cereal crops.

cereal crops. Blind, The, those who want, or are deficient in, the sense of sight. Blindness may vary in degree from the slightest impairment of vision to total loss of sight; it may also be temporary or permanent. It is caused by defect, disease, or injury to the eye, to the optic nerve, or to that part of the brain connected with it. Old age is sometimes accompanied with blindness, occasioned by the drying up of the humors of the eye, or by the opacity of the cornea, the crystalline lens, etc. There are several causes which produce blindness from birth. Sometimes the eyelids adhere to each other, or to the eyeball itself, or a membrane covers the eyes; sometimes the pupil of the eye is closed, or adheres to the cornea, or is not situated in the right place, so that the rays of light do not fall in the middle of the eye; besides other defects. The blind are often distinguished for a remarkable mental activity, and a wonderful development of the intel-Their touch and hearing, lectual powers.

particularly, become very acute. As early as 1260 an asylum for the blind was founded in Paris by St. Louis for the relief of the Crusaders who lost their sight in Egypt and Syria; but the first institution for the instruction of the blind was the idea of Valentin Hauy, brother of the celebrated mineralogist. In 1784 he opened an institution in which they were instructed not only in appropriate mechanical employments, as spinning, knitting, making ropes or fringes, and working in pasteboard, but also in music, in reading, writing, ciphering, geography, and the sciences. For instruction in reading he procured raised letters of metal; for writing he used particular writing-cases, in which a frame, with wires to separate the lines, could be fastened upon the paper; for ciphering there were movable figures of metal, and ciphering-boards in which the

figures could be fixed; for teaching geography maps were prepared upon which mountains, rivers, cities, and the boundaries of countries were indicated to the sense of touch in various ways, etc. Similar institutions were soon afterward founded in Amsterdam, Berlin, Brussels, Copenhagen, Dresden, Edinburgh, Liverpool, London, Vienna, and in many towns of the U.S. There are now comparatively few large cities that do not possess a school or in-stitution of some kind for the blind. The occupations in which the blind are found capable of engaging are such as the making of baskets and other kinds of wicker-work, brushmaking, rope and twine making, the making of mais and matting, knitting, netting, fancy work of various kinds, cutting firewood, the sewing of sacks and bags, the carving of articles in wood, etc. Piano-tuning is also successfully carried on by some, and the cleaning of clocks and watches has even been occasionally practised

by them. Various systems have been devised for the purpose of teaching the blind to read, some of which consist in the use of the ordinary Roman alphabet, with more or less modification, and some of which employ types quite arbitrary in form. In all systems the characters rise above the surface of the paper so as to be felt by the fingers. The type adopted by Hauy was the script or italic form of the Roman letter. Before this, Gall of Edinburgh made use of an embossed alphabet based on the ordinary Roman small letters, in which all curves were replaced by angular lines, and in 1834 he published the Gospel of St. John in this character. Subsequently he introduced various improvements, and in particular the letters were produced with serrated surfaces, thus giving greater distinctness. Alston of Glasgow, Howe of Boston, and others also used the Roman form; but the former (who was the first to print the whole Bible, in 1840) adopted the Roman capitals, while the latter adopted the small name in the second seco invented by Lucas of Bristol; another is a phonetic shorthand devised by Frere of Lon-In Doctor Moon's alphabet some of the don. characters are Roman, others are based on or suggested by the Roman characters. The Braille system is one in which the letters are formed by a combination of dots. Doctor Moon's system from its simplicity and the size of its characters is in very general use in books for the blind. There are also systems by which the blind are enabled to write. In the U.S.

almost every state has a school for the blind. Blind fish, the name of several species of fish, family Amblyopsidæ, inhabiting the American cave-streams. They are all small, the largest not exceeding five inches. In the typical species of the Mammoth Cave of Kentucky, the eyes are reduced to a useless rudiment hidden under the skin, the body is translucent and colorless, and the head and body are covered with numerous rows of sensitive

# Blind-worm

papillæ, which form very delicate organs of touch.



Blind Fish of Mammoth Cave.

**Blind-worm** (or slow-worm), a reptile, forming a connecting link between the lizards and the snakes, perfectly snake-like in form, having no appearance of external limbs, though the bones of the shoulders and pelvis exist in a rudimentary form: length about a foot, and of nearly equal thickness throughout. Its eyes, though brilliant, are small, and hence its common name. It is common in Great Britain, and is spread over almost the whole of Europe, Western Asia, and Northern Africa. It is perfectly harmless, living upon worms, insects, and snails, and hibernating during the winter.



Blind-worm.

It receives its specific name of *fragilis* from the fact that when frightened it stiffens its muscles to such an extent, and becomes so rigid, that its tail may be snapped off by a slight blow.

Bliss, CORNELIUS N., American merchant and statesman, b. in Mass. 1833. In 1866 he moved to New York City and became interested in manufactures. He arose to political prominence as treasurer of the Republican national campaign committee. He is director in several banks, trusts, etc. President McKinley appointed him secretary of the interior in 1897.

Bilss, PHILIP PAUL (1838–1876), an American evangelist, b. in Pa. In company with the evangelist Dwight L. Moody he held mission services in all parts of the U.S., leading in the singing of hymns of his own composition. Hold the Fort is the best-known of these. He was killed in the terrible Ashtabula, O., railroad wreck.

# Block-system

**Blister**, a topical application which, when applied to the skin, raises the cuticle in the form of a vesicle, filled with serous fluid, and so produces a counter-irritation. The Spanish fly-blister operates with most certainty and expedition, and is commonly used for this purpose, as well as mustard, hartshorn, etc.

**Bister-steel**, iron bars which, when converted into steel, have their surface covered with blisters, probably from the expansion of minute bubbles of air. Steel is used in the blister state for welding to iron for certain pieces of mechanism, but is not employed for making edge-tools. It requires for this purpose to be converted into cust or shear steel.

Block, a mechanical contrivance consisting of one or more grooved pulleys mounted in a casing or shell which is furnished with a hook, eye, or strap by which it may be attached to an object, the function of the apparatus being to transmit power or change the direction of motion by means of a rope or chain passing round the movable pulleys. Blocks are single, double, treble, or four-fold, according as the number of sheaves or pulleys is one, two, three, or four. A running block is attached to the object to be raised or moved; a standing block is fixed to some permanent support. Blocks also receive different denominations from their shape, purpose, and mode of application. They are sometimes made of iron as well as of wood. Blocks to which the name of dead-eyes has been given, are not pulleys, being unprovided with sheaves.

Blockade' is the rendering of intercourse with the seaports of an enemy unlawful on the part of neutrals, and it consists essentially in the presence of a sufficient naval force to make such intercourse difficult. It must be declared or made public, so that neutrals may have no-tice of it. If a blockade is instituted by a sufficient authority, and maintained by a sufficient force, a neutral is so far affected by it that an attempt to trade with the place invested subjects vessel and cargo to confiscation by the blockading power. The term is also used to describe the state of matters when hostile forces sit down around a place and keep possession of all the means of access to it, so as to entirely cut off its communication with the outside world, and so compel surrender from want of supplies.

**Block-house**, a fortified edifice of one or more stories, constructed chiefly of blocks of hewn timber. Block-houses are supplied with loopholes for musketry and sometimes with embrasures for cannon, and when of more than one story the upper ones are made to overhang those below, and are furnished with machicolations or loopholes in the overhung floor, so that a perpendicular fire can be directed against the enemy in close attack. Block-houses are often of great advantage, and in wooded localities readily constructed.

**Block-system**, a system of working the traffic on railways according to which the line is divided into sections, each section generally stretching from one station to the next, with a signal and telegraphic connection at

the end of each section. The essential principle of the system is that no train is allowed to enter upon any one section till the section is signaled wholly clear, so that between two successive trains there is not merely an interval of time, but also an interval of space.

**Biodgett**, HENRY WILLIAMS, b. 1821, in Amherst, Mass., an American jurist; studied law in Chicago, and began practice in 1845. In 1852 he was elected to the Illinois legislature as an anti-slavery Republican, and in the following year became state senator. He was for many years a railroad lawyer, and became president of the Chicago & Milwaukee Railroad. In 1870 he was appointed U. S. district judge for the northern district of Illinois, which office he still (1897) holds.

**Biodgett**, RUFUS, b. 1834, in Dorchester, N.H., American public man; became a banker and railroad superintendent, and was elected to the U. S. Senate from New Jersey in 1887.

**Bioemfontein** (blöm'fon-tin), the chief town and seat of government of the Orange Free State, South Africa, 680 mi. n. e. of Cape Town, situated in a high but healthy region. Pop, 5,817.

Blois (blwii), capital of the French dep. Loires-Cher, 99 mi. s.w. Paris, on the Loire. The old castle, which has played an important part in French history, was restored by the govern-ment in 1845. The main entrance is by a fine Gothic portal opening into a quadrangle, on the east side of which is a pillared cloister, on the north a pile of buildings in the Renaissance style, on the west some unfinished buildings, and on the south is the ancient part begun by the Dukes of Orleans. There is also a cathedral of late date, the Church of St. Nicholas (twelfth century), a bishop's palace, Roman aqueduct, etc. The castle was long occupied by the counts of the name; and became a favorite residence of the kings of France. Louis XII was born, Francis I, Henry II, Charles IX, and Henry III held their courts in it. Pop. 23,457.

**Bion' del**, a French minstrel and poet of the twelfth century, a confidential servant and instructor in music of Richard Cœur de Lion. While his master was the prisoner of the duke of Austria, Blondel, according to the story. went through Palestine and all parts of Germany in search of him. He sang the king's own favorite lays before each keep and fortress till the song was at length taken up and answered from the windows of the castle of Loewenstein, where Richard was imprisoned. This story is preserved in the chronicles of Rheims, of the thirteenth century.

**Biondin**, a noted French gymnast (1824-1897). was b. at St. Ouen, Pas de Calais. His real name was Jean François Gravelet. He had two brothers and three sisters, who were all tight rope performers. His first feat on the tight rope was in Lyons, when he was but six years old, and when he made an ascension to the height of 175 ft. Later he was placed by his father at the Ecole de Gymnase at Lyons, where he was trained to be an acrobat. Six months afterward he made his professional début, and his success was instantaneous. For years he traveled through France attending village fairs, with success and profit. In 1851 he joined the famous Ravel family of acrobats and came with them to America and appeared with them at Niblo's Garden. He remained with the Ravels eight years, and during his travels with them on this continent he visited Niagara for the first time. Blondin was at for his ambition, and he took up his abode near the Falls to study the practicability of his proposed feat. Then he set to work to bridge the distance with a hempen cord and made public the attempt. The rope was 1,100 ft. in length, and was stretched at an altitude of 160 ft. above the river at one side and crowned the seething torrent at a height of 175 ft. On Aug. 17, 1859, he made the trip in the presence of 50,000 spectators. Not content with simply walking across, he elaborated his performance, and made other trips blindfolded, and with a man on his back. His most daring feat, however, was when, at an engagement at the Crystal Palace, London, he trundled a wheelbarrow across a rope 200 ft. long, with his baby daughter in it. Then, he has since confessed, he felt the sensation of fear for the first time, not for himself, but for the child. The following year Blondin repeated his Niagara feat in the presence of the Prince of Wales. Blondin made a great deal of money during his career, but it is said that he lost the most of it in unfortunate speculation. The receipts of one performance in London reached the enormous sum of \$20,000.

**Blood**, the fluid which circulates through the arteries and veins of the human body and that of other animals, which is essential to the preservation of life and nutrition of the tissues. This fluid is more or less red in vertebrates, except in the lowest fishes. In insects and in others of the lower animals there is an analogous fluid which may be colorless, red, bluish, greenish, or milky. The venous blood of mam-mals is a dark red, but in passing through the lungs it becomes oxidized and acquires a bright scarlet color, so that the blood in the arteries is of a brighter hue than that in the veins. The central organ of the blood circulation is the heart (which see). The specific gravity of human blood varies from 1.045 to 1.075, and its normal temperature is 99° F. 1,000 parts contain 783.37 of water, 2.83 fibrin, 67.25 albu-men, 126.31 blood corpuscles, 5.16 fatty 15.08 various animal matters and matters, salts. When ordinary blood stands' for a time it separates into two portions, a red coagulated mass consisting of the fibrin, corpuscles, etc., and a yellowish watery portion, the serum. The blood corpuseles or globules are characteristic of the fluid. Those are minute, red and white bodies floating in the fluid of the blood. The red ones give color to the fluid, and are flattish discs, oval in birds and reptiles, and round in man and most mammals. In man they average 3300th inch in diameter, and in the Proteus, which has them larger than any other vertebrate,  $\frac{1}{\sqrt{2}}$  oth inch in length and  $\frac{1}{\sqrt{2}}$  d in breadth. The white or colorless

corpuscies are the same as the lymph or chyle corpuscies, and are spherical or lenticular, nucleated, and granulated, and rather larger than the red globules.

Blood has come to have many commercial uses. The Scandinavians were the first people who, when they butchered animals, preserved the blood. They used this in making bloodcake and blood sausage. All the large packing houses save every drop of blood. It is manufactured into fertilizers, and one large packing house in Chicago turns out from eight to twelve tons of it every day. This fertilizer is sold at from \$32 to \$45 a ton. The blood is caught in large pans in the slaughtering pen and is car-ried off to drying vats. Here it is heated in large caldrons at a temperature of 200 degrees, the water in the blood, amounting to over 70 per cent. of the whole, is driven off in the form of steam, and the albumen is coagu-lated into a thick mass. This mass is run off into a great hydraulic press. The power is put on and more of the water is forced off through the burlap which forms the bottom of the press. When the pressure is released the blood comes out in solid, moist chunks. The chunks are then fed through huge revolving rollers. The rollers are heated by steam and still more water is pressed out of the blood. The product then comes out dry for the most part and hard. The finer dust and crumbs fall through a sieve and the large rough pieces which remain are carried along to the attrition mills where they are ground into fine powder. The attrition mill consists of two upright cylinders revolving in opposite directions, one in-side the other. The cylinders are made of steel rods set both together, and when the chunks of dried blood are put in at the top they are crushed against the rod and ground together, so that by the time they reach the bottom, they are as fine as powder. The product is placed in air-tight compartments until it is ready for mixing with potash and phosphoric acid to make a complete fertilizer. On account of the large amount of nitrogen which it contains in the form of ammonia this is very valuable as a fertilizer. Ordinary blood contains about 17 per cent. of ammonia, of which about 131 per cent. is pure hydrogen. Blood is also used in the manufacture of sugar. It is first dried at a temperature of 110 degrees in order to prevent the coagulation of the albumen. This is a long process, but when it is completed the product is in the form of big cakes. It is then taken to the sugar refinery, dissolved in warm water, and added to the sugar as a clarifier. The albumen collects all the floating products in the sugar and carries them to the bottom of the tank. Blood is also coming into use as a medicine, and nearly all drug stores keep defibrinated blood, and many physicians prescribe it in cases where the pa-tient's blood is "thin," or lacks the necessary amount of red corpuscles. The preparation is simple. The warm blood is caught in pans as it comes from the animal, and is whipped rapidly until all the fibrin clings to the wood. The fibrin is then taken out and thrown away.

#### Bloodroot

The remaining part, the albumen and serum, are dried hard at a temperature of about 105 The mass which remains is cut up degrees. and rolled into little pills and is then ready for use. Blood is also used in the manufacture of buttons. Many of the dark, rich-colored buttons are made of blood pressed into the proper form by means of hydraulic machines. Imitation tortoise shell articles are composed largely of blood, and it is used extensively by The use of the Japanese in lacquer work. warm blood of higher animals is considered beneficial in the treatment of consumption It is important that the blood and anæmia. be obtained before it has been exposed enough to coagulate it. The blood should be drunk as it comes from the animal. Since the introduction of defibrinated blood the use of warm blood has fallen off.

**Bioodhound**, a variety of dog with long, smooth, and pendulous ears, remarkable for the acuteness of its smell, and employed to recover game or prey which has escaped wounded from the hunter, by tracing the lost animal by the blood it has spilt; whence the



Bloodhound.

name of the dog. There are several varieties of this animal, as the English, the Cuban. and the African bloodhound. In former times bloodhounds were not only trained to the pursuit of game, but also to the chase of man. In America they used occasionally to be employed in hunting fugitive slaves, but are now only used occasionally for tracking criminals and escaped convicts.

**Blood-money**, the compensation by a homicide to the next of kin of the person slain, securing the offender and his relatives against subsequent retaliation; once common to Scandinavian and Teutonic countries, and still a custom among the Arabs. The term is also applied to money earned by laying or supporting a charge implying peril to the life of an accused person.

**Bloodroot**, a plant of Canada and the U. S. belonging to the poppy order, and so named from its root-stock yielding a sap of a deep orange color. Its leaves are heartshaped and deeply lobed; the flower grows on a scape and is white or tinged with rose. The



# Bloodwood

plant has acrid narcotic properties, and has been found useful in various diseases. Another American plant used as a mild tonic, is also known as bloodroot.

**Bloodwood**, a name of several trees. Indian bloodwood is a large tree of the henna family with wood of a blood-red color, used for many purposes. It is called also *jarool*. **Bloody Assizes**, those held by the English

**Bloody Assizes**, those held by the English Judge Jeffreys in 1685, after the suppression of Monmouth's rebellion. Upwards of 300 persons were executed after short trials; very many were whipped, imprisoned, and fined; and nearly 1,000 were sent as slaves to the American plantations.

**Bloom,** a lump of puddled iron, which leaves the furnace in a rough state, to be subsequently rolled into the bars or other material into which it may be desired to convert the metal. Also a lump of iron made directly from the ore by a furnace called a "bloomery."

**Biomer Costume**, a style of dress adopted about the year 1840 by Mrs. Bloomer of New York, who proposed thereby to effect a complete revolution in female dress, and add materially to the health and comfort of women. It consisted of a jacket with close sleeves, a skirt reaching a little below the knee, and a pair of Turkish pantaloons secured by bands round the ankles. An improvement of this costume has obtained considerable popularity among female bicyclists.

**Bloomington,** McLean co., Ill., 45 mi. s.e. of Peoria. Railroads: Illinois Central; Chicago & Alton; C. C. & St. L.; and Lake Eric & Western. Industries: railroad shops, two iron foundries, flour mill, candy and medicine factories. Surrounding country agricultural. One coal shaft in vicinity. The town was first settled in 1826 by two families from Ohio, and became a city in 1831. Pop. est. 1897, 24,500.

**Blouse** (blouz), a light, loose upper garment, resembling a smock-frock, made of linen or cotton, and worn by men as a protection from dust or in place of a coat. A blue linen blouse is the common dress of French workmen.

Blowfly, a name for the various species of



air in confined spaces, and the like. This may consist of a single pair of bellows, but more generally two pair are combined to secure continuity of current. The most perfect blowingmachines are those in which the blast is produced by the motion of pistons in a cylinder,

### Blowpipe

or by some application of the fan principle. For smelting and refining furnaces, where a blast with a pressure of 3 or 4 lbs. to the square inch is required, blowing-engines of large size and power, worked by steam. are employed.

Blowpipe, an instrument by which a current of air or gas is driven through the flame of a lamp, candle, or gas jet, and that flame



glass, or other substance, usually 7 in. long and 4 in. in diameter at one end, and tapering so as to have a very small aperture at the other, within 2 in. or so of which it is bent nearly to a right angle, so that the stream of air may be directed sideways to the operator. The flame is turned to a horizontal direction, assumes a conical shape, and consists of two parts of different colors. The greatest heat is obtained at the tip of the inner blue flame. Here the substance subjected to it is burned or oxidized, a small piece of lead or copper, for instance, being converted into Hence the name of the oxidizing its oxide. flame. By shifting the substance to the interior blue flame, which is wanting in oxygen, this element will be abstracted from the substance, and a metallic oxide, for instance, will give out its metal; hence this is called a reducing flame. Thus various minerals can be either oxidized or reduced at pleasure, and the pipe forms a ready test in the hands of the mineralogist, who may use fluxes along with substances tested, watch how they color the flame, what vapor they give out, etc. The blowpipe may be provided with several movable nozzles to produce flames of different The current of air is often formed by sizes. a pair of bellows instead of the human breath, the instrument being fixed in a proper frame for the purpose. The most powerful blowpipe is the oxyhydrogen or compound blowpipe, an instrument in which oxygen and hydrogen (in the proportions necessary to form water, propelled by hydrostatic or other pressure, and coming from separate reservoirs, are made to form a united current in a capillary, orifice at the moment when they are kindled. The heat produced is such as to consume the diamond, and to dissipate in vapor or in gase-

## Blubber

ous forms most known substances. The blowpipe is used by goldsmiths and jewelers in soldering, by glass-workers in sealing the ends of tubes, etc., and extensively by chemists and mineralogists in testing the nature and composition of substances.

The name is also given to the pipe or tube through which poisoned arrows are blown by the breath, used by South American Indians and natives of Borneo. The tube or blowpipe is 8 to 12 ft. long, with a bore scarcely large enough to admit the little finger; and the arrow is forced through by a sudden expulsion of air from the lungs (like a pea from a boy's pea-shooter), being sometimes propelled to a distance of 140 yards.

**Blubber,** the fat of whales and other large sea animals, from which train oil is obtained. The blubber lies under the skin and over the muscular flesh. It is eaten by the Eskimo and the sea-coast races of the Japanese islands, the Kuriles, etc. The whole quantity yielded by one whale ordinarily amounts to 40 or 50, but sometimes to 80 or more cwt.

Blücher (blü'her), GEBHARD LEBERECHT von (1742-1819), distinguished Prussian general. He entered the Swedish service when 14 years of age and fought against the Prussians but was taken prisoner in his first campaign, and was induced to enter the Prussian service. He commanded with distinction on the Rhine in 1793 and 1794. In 1802, he took possession of Erfurt and Mühlhausen. Oct. 14, 1806, he fought at the battle of Auerstädt. After the peace of Tilsit he labored in the department of war at Königsberg and Berlin. In the campaign of 1812, when the Prussians assisted the French, he took no part. When seventy years old, he was appointed commander-in-chief of the Prussians and the Russian corps under General Winzingerode. His hero-ism in the battle of Lutzen (May 2, 1813) was rewarded by the Emperor Alexander with the order of St. George. He led the Prussian army which invaded France early in 1814, and entered the capital of France. On the renewal of the war in 1815 the chief command was again committed to him, and he led his army into the Netherlands. June 15 Napoleon threw himself upon him, and Blücher, on the 16th, was defeated at Ligny. In the battle of the 18th Blücher arrived at the most decisive moment upon the ground, and taking Napoleon in the rear and flank assisted materially in completing the great victory of Waterloo. His energy and rapid movements procured him the name of "Marshal Vorwärts" (Forward).

**Blue**, one of the seven colors into which the rays of light divide themselves when refracted through a glass prism, seen in nature in the clear expanse of the heavens; also a dye or pigment of this hue. The substances used as blue pigments are of very different natures, and derived from various sources; they are all compound bodies, some being natural and others artificial. They are derived almost entirely from the vegetable and mineral kingdoms. The principal blues used in painting

# Bluefish

are ultramarine, which was originally prepared from lapis-lazuli or azure-stone-a mineral found in China and other oriental countriesbut, as now prepared, it is an artificial compound of china clay, carbonate of soda, sul-phur, and charcoal: Prussian, or Berlin blue, which is a compound of cyanogen and iron; blue bice, prepared from carbonate of copper; indigo blue, from the indigo plant. Besides these, there are numerous other blues used in art, as blue-verditer, smalt- and cobalt-blue, from cobalt, lacmus, or litmus, etc. Before the discovery of aniline or coal-tar colors dyers chiefly depended for their blues on woad, archil, indigo, and Prussian blue, but now a series of brilliant blues are obtained from coal tar, possessing great tinctorial power and various degrees of durability

**Bluebeard**, the hero of a well-known tale, originally French, founded, it is believed, on the enormities of a real personage, Giles de Laval, Count de Retz a great nobleman of Brittany, put to death for his crimes in 1440.

**Bluebird**, a small bird, very common in the U.S. The upper part of the body is blue, and the throat and breast of a dirty red. It makes



Bluebird.

its nest in the hole of a tree or in the box that is so commonly provided for its use by the friendly farmer. The bluebird is the harbinger of spring; its song is cheerful, continuing with little interruption from March to October, but is most frequently heard in the serene days of spring. It is also called *blue robin* or *blue redbrenst*, and is regarded with the same sort of sentiments as the robin of Europe.

**Blue books**, the official reports, papers, and documents printed for the British government and laid before the Houses of Parliament. They are so-called from being stitched up in dark-blue paper wrappers, and include bills presented to and acts passed by the house; all reports and papers moved for by members, or granted by government on particular subjects; the reports of committees; statistics of the trade, etc., also, in America and England, a book containing the names of all persons holding public offices, with other particulars.

**Bluefish**, a fish common on the eastern coasts of America, allied to the mackerel, but larger, growing to the length of three feet or more, and much esteemed for the table. It is very destructive to other fishes. It is also called

horse mackerel, greenfish, skipjack, etc. Blue grass, an American pasture grass of great excellence, especially abundant in Kentucky. It is exceedingly thrifty.

Blue Laws, a name for certain laws said to have been made in the early government of New Haven, Conn., anent breaches of manners, morality, and religion. There were several codes enacted at different times. The most important of the Blue Laws are as follows:

"No Quaker or dissenter from the established worship of this dominion shall be allowed to give a vote for the election of magistrates or any officer.

"No food or lodging shall be offered to a Quaker, adamite, or other heretic.

"If any person turns Quaker, he shall be banished, and not suffered to return, but upon pain of death.

"No priest shall abide in the dominion; he shall be banished and suffer death on his return. Priests may be seized by any one without a warrant.

"No one to cross a river but an authorized ferry man.

"No one shall run on the sabbath day, or walk in his garden, except reverently to and from meeting.

"No one shall travel, cook victuals, make beds, sweep house, cut hair, or shave on the sabbath day.

"No woman shall kiss her child on the sabbath or fasting day.

"The sabbath shall begin at sunset on Saturday.

"To pick an ear of corn growing in a neighbor's garden shall be deemed theft.

"A person accused of trespass in the night, shall be judged guilty, unless he clear himself

by his oath. "When it appears that an accused has confederates, and he refuses to discover them, he may be racked.

"No one shall buy or sell lands without permission of the selectmen.

"A drunkard shall have a master appointed by the selectmen who are to debar him from the liberty of buying and selling.

"Whoever publishes a lie to the prejudice of his neighbor shall sit in the stocks, or be whipped fifteen stripes.

"No minister shall keep a school.

"Men stealers shall suffer death.

"Whoever wears clothes trimmed with gold, silver, or bone lace above two shillings by the yard, shall be presented by the grand jurors, and the selectmen shall tax the offender at 300 pounds estate.

"A debtor in prison, swearing he has no estate, shall be let out and sold, to make satisfaction.

"Whoever brings cards or dice into this dominion shall pay a fine of 5 pounds.

'No one shall read common prayer, keep Christmas, or saint-days, make minced pies,

dance, play cards, or play on any instrument of music, except the drum, trumpet, and Jew's-harp.

"No gospel minister shall join people in marriage; the magistrates only shall join in marriage, as they may do it with less scandal to Christ's church.

"A man that strikes his wife shall pay a fine of 10 pounds. A woman that strikes her husband shall be punished as the court directs.

"A wife shall be deemed good evidence against her husband.

"Married persons must live together or be imprisoned.

Every male shall have his hair cut round according to a cap."

Blue Mountains, the central mountain range of Jamaica, the main ridges of which are from 6,000 to 8,000 ft. high. Also a mountain chain of New South Wales, part of the great Dividing Range. The highest peaks rise over 4,000 ft. above the sea. The range is now traversed by a railway, which attains a maximum height of 3,494 ft.

Blue Peter, a blue flag having a white square in the center, used to signify that the ship on which it is hoisted is about to sail.

Blue Pill, a preparation of mercury for medicinal use. It consists of two parts by weight of mercury triturated with three parts of conserve of roses till it loses its globular form. This is mixed with one part by weight of licorice-root powder, so that 5 grains of the mixture contain 1 grain of mercury

Blue Ridge, the most easterly ridge of the Alleghany (or Appalachian) Mountains. The most elevated summits are the Peaks of Otter (4.000 ft.) in Virginia.

Bluewing, a genus of American ducks, so called from the color of the wing coverts. One series is brought in great quantities to market, the flesh being highly esteemed for its flavor.

Boa, a genus of serpents, having the jaws so



Head of Boa.

constructed that these animals can dilate the mouth sufficiently to swallow bodies thicker



than themselves. They are also distinguished by having a hook on each side of the vent; the tail prehensile; the body compressed and largest in the middle, and with small scales, at least on the posterior part of the head. The genus includes some of the largest species of serpents, reptiles endowed with immense muscular power. They seize sheep, deer, etc., and crush them in their folds, after which they swallow the animal whole. The boas are peculiar to the hot parts of South America. The *Boa Constrictor* is not one of the largest members of the genus, rarely exceeding 20 ft. in length; but the name boa or boa constrictor is often given popularly to any of the large serpents of similar habits, and so as to include the pythons of the Old World and the anaconda and other large serpents of America.

Boab' dil, ABU-ABDULLAH, last Moorish king of Granada, gained the throne in 1481 by expelling his father, Muley Hassan; and became the vassal of Ferdinand of Aragon. By his tyranny he provoked the hostility of his own subjects, and Ferdinand, taking advantage of the dissensions which prevailed, laid siege to Granada. The Moors made a valiant defense, but Boabdil capitulated, and retired to a domain of the Alpujarras assigned him by the victor. He afterward passed into Africa, and fell in battle while assisting the king of Fez in an attempt to dethrone the king of Morocco. Boadice'a, queen of the Iceni, in Britain,

**Boadice'a**, queen of the Iceni, in Britain, during the reign of Nero. Having been treated in the most ignominious manner by the Romans, she headed a general insurrection of the Britons, attacked the Roman settlements, reduced London to ashes, and put to the sword all strangers to the number of 70,000. Suetonius, the Roman general, defeated her in a decisive battle (A. D. 62), and Boadicea. rather than fall into the hands of her enemies, put an end to her own life by poison.



Wild Boar.

**Boar**, the male of swine. The wild hog, the original of the domestic pig, is generally spoken of as the *wild boar*.

**Board of Trade** (or Chamber of Commerce), is an association of merchants, traders, producers, and other persons engaged in commercial pursuits for the purpose of facilitating trade by united action, of acting as a species of

court of arbitration in commercial questions, and generally of attaining, by combination, advantages in trade beyond the reach of individual enterprise or responsibility. Marseilles, in France, was the first city in the world to establish a Board of Trade, or Chamber of Commerce. This partook partly of a political character, and shared in the control of municipal affairs. In 1700 the chamber of commerce in Paris was established, and a few years thereafter corresponding institutions were organized in the other leading cities of France. The Chamber of Commerce of Glasgow is the oldest in Great Britain, having been established in 1783; the Edinburgh Chamber was next organized, having taken the lead in the movement for the abolition of the Corn laws. The London Chamber of Commerce, or the Royal Exchange, is the grand center of the commerce of the Old World. Next to it in importance stands the Liverpool Exchange with which American commercial dealers have the most direct connection. The Manchester, Hull, Leeds, and other exchanges do an immense business and exercise a great influence over the trade of that kingdom.

The Chamber of Commerce of New York was established in 1768, and was an important adjunct of the municipal government. The order in rank as to financial importance of the great metropolitan grain and produce exchanges of the country may be thus stated: 1, New York; 2, Chicago: 3, Boston: 4. Philadelphia; 5, Baltimore. The produce exchange of New York City has now over 3,000 members, but the actual volume of trade done by it is not as great as that of the Chicago Board of Trade with its 1,840 members. The latter body was organized in 1848, with 82 members. The principal boards of trade in the West in regard to volume of business rank, after the Chicago board, as follows: 1, St. Louis; 2, Milwaukee; 3, Detroit: 4, Cleveland; 5, Toledo; 6, Cincinnati; 7, Buffalo.

The modern practise of trading on margins has grown to be a leading feature of the business of all boards of trades in this country. and to a large extent also of those in the Old World. This system consists in the trader putting up with his broker a sufficient amount to cover the ordinary fluctuations of the security. and the broker furnishes the rest of the capital necessary. When the margin is exhausted the broker notifies his principal, and if it is not made good, the whole amount "put up' by the trader is forfeited. and the broker "closes out" the "deal." The distinction between "long" and "short" transactions is that in the former the trader buys for an advance, and in the latter he sells for a decline. Carry-ing charges are in favor of the short seller. These charges are made up of storage, interest, and insurance, and are represented by the excess of the price for future delivery over the cash price.

The method of trading, specifically, is substantially the following on all boards of trade in the U. S. Suppose it to be in January, and the trader wishes to buy 5,000 bushels of wheat

21

for February delivery. If he buys at \$1 a bushel, he advances his broker \$250, which is five cents a bushel margin. If it advances to \$1.05 he can order the broker to sell it, and if he chooses withdraw his margin and profit to the amount of \$250. If the price recedes, he must either deposit enough margin with his broker to cover the falling off or lose what he has advanced.

The prices of wheat have in the past ten years fluctuated as follows on the Chicago Board of Trade, which, of course, is an index to the fluctuations throughout the country, and it may also be added, to those in Europe as well:—

Years.	Months the lowest prices were reached.	Range for the entire year.	Months the highest prices were reached.
1887	August	\$ .66% @ \$ .94%	June
1888	April	.71% @ 2.00	September
1889	June	.75% @ 1.08%	February
1890	February	.745 @ 1.085	August
1891	July	.85 @ 1.16	April
1892	October	.69% @ .91%	February
1893	July	.54 @ 1.88	April
1894	September	.50 @ .65	April
1895	January	.48% @ .55%	May
1896	August	.53 @ .931%	December

Most boards of trade have their own clearing houses, and the rule that prevails in the clearing house of the Chicago Board may be taken as representative of the entire system in the U.S., to-wit: Parties whose reports show a net balance against them must accompany the report with a certified check for such balance made payable to the order of the clearing house. The regulations of this clearing house are as thorough and strict as those of the bankers' clearing houses. By common consent a basis of grading and inspection of grains and provisions has been established throughout the U. S., in which all the boards of trade unite. White winter wheat is divided into Nos. 1, 2, 3, and 4; long red winter into Nos. 1 and 2; hard winter wheat into Nos. 1, 2, and 3; red winter into Nos. 1, 2, 3, and 4; and Colorado wheat into Nos. 1, 2, and 3. There is also the Turkish red winter wheat. Spring wheat is classed: No. 1 northern spring, No. 1 spring, No. 2 spring, No. 3 spring, No. 4 spring, Nos. 1, 2, and 3 white spring. Black Sea and flinty Fife wheat, and rice wheat. The same careful and close discrimination is made with regard to corn. oats, rye, barley, and all other articles. The most stringent regulations are made to prevent fraudulent inspection, and the present system may be considered one of almost absolute perfection. The least "crookedness " on the part of any member, however prominent he may be, is visited with immediate suspension, and his trial is prosecuted with a rigid impartiality not surpassed by the courts of law.

While there is a considerable amount of cash buying and selling, the great preponderance of business is done on margins, like that on the stock exchanges. Thousands of persons trade "on 'change" who never see the inside of the board of trade. An immense amount of trading is done by mail, telegraph, and telephone. There is a widespread misunderstanding in regard to transactions on the board, many persons believing that no property passes on purchases and sales on margins, whereas the rules of the board not only contemplate the delivery of all property bought and sold on the floor, but express provision has been made therefor, and strict penalties prescribed for all damages that may arise in case of nondelivery upon the maturity of a contract. A board of trade contract matures on the last day of the term mentioned in it, and all transactions between members for the purchase or sale of grain, etc., on the floor of the board are strictly contracts under its rules.

A corner is an artificial scarcity in grain, pork, or other commodity, created by a combination organized for the purpose of holding the article affected off the market in order to extort abnormally high prices. The principal wheat corners on the Chicago Board of Trade, which have been mostly participated in to a large extent by dealers in other markets, east and west, have occurred on the following dates:—

1867-On May 18 prices of wheat were forced to \$2.85, closing at \$2.16.

1871—In August prices were advanced to \$1.30, but closed at \$1.10<sup>1</sup>.

1872—During August wheat sold at \$1.61, and closed at \$1.19.

1880—During May the price ranged from \$1.12 to \$1.19, closing at \$1.14.

1881—In August prices advanced from \$1.19 to \$1.38, and closed at \$1.38.

1882—Corners were run in April, June, July. and September.

1887—In June the memorable Cincinnati combination to corner wheat developed. Prices were advanced from 80% to 94% to 94% but the corner collapsed, and the price declined to 68c.

 $1888-\Lambda$  successful corner was operated in September, wheat selling from  $89\frac{1}{2}$ c to 32.00, the latter price being reached on the closing day.

Life on the board of trade of a great metropolis is intensely exciting. The fact that fortunes are sometimes made or lost in a day gives a feverish tenor to the career of a man who follows trading "on 'change" as his occupation. At the same time, the discipline of the experience which he has to undergo gives him a quickness of perception and a capability of prompt decision which he can scarcely gain anywhere else. The brokers on the Chicago Board of Trade, for example, have a nomenclature peculiar to themselves, and to facili-tate operations in the "pits" (the circular depressions on the Board), they have a complete system of signs and motions by which they can make themselves understood above the din constantly prevailing. A sign made with open hand of the broker toward the person he is in communication with signifies "sell"; if he shows the back of his hand, it means "buy"; one finger raised means 5,000 bushels or other units of the article dealt in; two fingers raised signifies 10,000 bushels, etc. So

that, in the midst of all the noise and confusion which the outsider observes on the floor of the board during the hours when it is in session, there is a vast and thoroughly systematized volume of business being transacted with a facility and celerity utterly incomprehensible to the uninitiated.

Boat, a small open vessel or water craft usually moved by oars or rowing. The forms, dimensions, and uses of boats are very various, and some of them carry a light sail. The boats belonging to a ship of war are the launch or longboat, which is the largest, the barge, the pinnace. the yawl, cutters, the jolly-boat and the gig. The boats belonging to a merchant vessel are the launch or longboat, before mentioned, the skiff, the jolly-boat or yawl, the stern boat, the quarterboat, and the captain's gig. Every passenger ship is re-quired to carry a number of boats according to the following scale: two boats for every ship of less than 200 tons, three, when 200 and less than 400; four, 400 and less than 600; five, 600 and less than 1,000; six, 1,000 and less than 1.500; seven, 1.500 and upwards. One of such boats must in all cases be a longboat, and one a properly fitted lifeboat.

**Boatbill**, a South American bird of the family of herons, about the size of a common fowl.



Boatbill.

with a bill not unlike a boat with the keel uppermost; its chief food is fish.

Boat fly, an aquatic hemipterous insect which swims on its back: the hind legs aptly



Water Boat Fly.

enough resembling oars, the body representing a boat; hence the name.

#### Boccaccio

**Boat** 'swain (commonly pronounced  $b\bar{v}$ 'su). a warrant-officer in the navy who has charge of the sails, rigging, colors, anchors, cables, and cordage. His office is also to summon the crew to their duty, to relieve the watch, etc. In the merchant service one of the crew who has charge of the rigging and oversees the men.

**Bob** bin, a reel or other similar contrivance for holding thread. It is often a cylindrical piece of wood with a head, on which thread is wound for making lace; or a spool with a head at one end or both ends, intended to have thread or yarn wound on it, and used in spinning machinery (when it is slipped on a spindle and revolves therewith) and in sewing machines (applied within the shuttle).



Bobolink.

**Bobolink,** a name given to two distinct birds. The first, also known by the name rice-bunting, a bird of the bunting family, which migrates over N. A. from Labrador to Mexico, appearing in Massachusetts about the beginning of May. Their food is insects, worms, and seeds, including rice in South Carolina. The song of the male is singular and pleasant. When fat their fiesh is of a fine flavor. The other species is known as the rice bunting, also as the Java sparrow, and paddy bird. It belongs to the true finches, a group nearly allied to the buntings. It possesses a largely developed bill; the head and tail are black, the belly rosy, the cheeks of the male white, and the legs flesh-colored. It is dreaded in Southern Asia on account of the ravages it commits in the rice fields. It is frequently brought to Europe, and is found in aviaries.

**Boccaccio** (bok-kåt'chō), GIOVANNI (1313-1375), Italian novelist and poet, son of a Florentine merchant. He spent some years unprofitably in literary pursuits and the study of the canon law, but in the end devoted himself entirely to literature. In 1831 Boccaccio fell in love with Maria, daughter of King Robert. His first work, a romantic love tale in prose; *Filocopo*, was written at her command, as was also the *Tescide*, the first heroic epic in the Italian language. In 1341 he returned to Florence. In 1344 he returned to Naples. *Dicameron*, on which his fame rests, consists of 100 tales represented to have been related in equal portions in 10 days by a party of ladies and gentlemen at a country house near Florence while the plague was raging in that city. In 1373 he was chosen by the Florentines to occupy the chair which was established for the exposition of *Dante's Dirina Comedia*. His lectures continued till his death.

**Bocca Tigris** (or Bogue), the embouchure of the principal branch of the Chu Kiang, or Canton River, China.

**Bochum** (boh' um), a Prussian town, prov. of Westphalia, 5 mi. e.n.e. of Essen; manufactories of iron, steel, hardwares, etc. Pop. 47,601.

**Bock**, Bochbier, a variety of German beer made with more malt and less hops than ordinary German beer, and therefore sweeter and stronger.

**Bockenheim** (-hīm), town of Germany, forming almost a suburb of Hamburg; flourishing manufactures of machinery, etc. Pop. 18,730.

manufactures of machinery, etc. Pop. 18,730. **Bode** (bo'de). JOHN ELERT (1747-1826), German astronomer. His best works are his Astronomical Almanac and his large Celestial Atlas, giving a catalogue of 17,240 stars (12,000 more than in any former chart). Bode's Law is the name given to an arithmetical formula, previously made known by Kepler and Titius of Wittenberg, expressing approximately the distances of the planets from the sun. The law has no theoretical foundation.

**Bodleian Library** at Oxford, founded by Sir Thomas Bodley in 1598, opened 1602. It claims a copy of all works published in Britain, and for rare works and MSS. it is said to be second only to the Vatican. It contains over 1,500,000 volumes.

Bochmeria (bē-mē'ri-a), a genus of plants,



Bœhmeria. a.-male flower; b.-glomerule of female flowers; c.-single female flower; d.-pericarp.

#### Bogardus

closely resembling the stinging nettle. A number of the species yield tenacious fibers, used for making ropes, twine, net, sewing thread. One species is the Chinese grass, the Malay ramee which is shrubby and 3 or 4 ft. high. It is a native of China, Southeastern Asia, and the Asiatic Archipelago, where, and in India, it has long been cultivated. The plant has been introduced into cultivation in parts of the U. S., Algeria, France, etc., under its Malay name of ramee (or ramie).

**Baco' tia**, a division of ancient Greece. lying between Attica and Phocis. Along with Attica, Bacotia now forms a nomarchy of the kingdom of Greece, with a pop. of 185,364. Area 1,119 sq. mi. See *Greece*.

Boers (börz; Dutch, boer, a peasant or husbandman), the Cape-Dutch name for the farmers of Dutch origin in South Africa. In 1836-37 large numbers of the Boers, being dissatisfied with the British government in Cape Colony, migrated northward to what is now Natal. Here their ill-treatment of the natives soon led to war, and the British had to interfere and ultimately (1843) annex the country. The Boers again migrated, but their new settle-ment was annexed in 1848. They then began to form the present Transvaal, where their illtreatment of the colored races has caused the British government again and again to interfere. They now occupy the Transvaal and the Orange State. The Boers, who are all rigid Calvinists, are described as frugal, industrious, and hospitable, but distrustful of foreigners, especially of the English. The Boers are by no means scrupulous and humane in their dealings with the natives; but remarkable for courage, love of freedom, sobriety, and industry, of strong and well-developed physique, good horsemen, and splendid marksmen.

Bog, a piece of wet, soft, and spongy ground, where the soil is composed mainly of decaying and decayed vegetable matter. Such ground is valueless for agriculture until reclaimed, but often yields abundance of peat for fuel. Bogs are generally divided into two classes; red bogs, or peat mosses, and black bogs, or mountain mosses. The former class are found in extensive plains frequently running through several counties, such as the Chatmoss in Laucashire, England, and the Bog of Allen in Ireland, the depth varying from 12 to 42 ft. Their texture is light and full of filaments. and is formed by the slow decay of mosses and plants of different kinds. The lower parts. being more entirely decayed, approach nearer to the nature of the humus than the upper portion, and, as being more carbonaceous, are more valuable for fuel. Black bog is formed by a more rapid decomposition of plants. It is heavier and more homogeneous in quality, but is usually found in limited and detached portions, and at high elevations where its reclamation is difficult.

**Bogar' dus,** JAMES (1800-1874), an American inventor, b. in Catskill, N. Y. Among his inventions were the "ring-flyer" or "ring-spinner" used in cotton manufacture, the eccentric

mill, an engraving machine, and the first dry gas meter. In 1830 he gained the reward offered by the British government for the best plan for carrying out the penny postage system by the use of stamps. In 1847 he built the first complete cast-iron structure in the world, and the first wrought-iron beams were made from his design. His delicate pyrometer and deep-sea sounding machine were valuable additions to scientific instruments.

Bog oak, trunks and large branches of oak found imbedded in bogs and preserved by the antiseptic properties of peat, so that the grain of the wood is little affected by the many ages during which it has lain interred. It is of a shining black or ebony color, derived from its impregnation with iron, and is frequently converted into ornamental pieces of furniture and smaller ornaments as brooches, earrings, etc.

**Bogotá** (formerly Santa Fé de Bogotá), a city of South America, capital of Colombia, and of the state or department of Cundinamarca. The inhabitants are mostly Creoles. Bogotá is an emporium of internal trade, and has manufactures of soap, cloth, leather, etc., not of great importance. It was founded in 1538. Pop. 726,000.

**Bogue** (bög), DAVID (1750-1825), the originator of the London Missionary Society. He studied at Edinburgh, and was licensed as a preacher of the church of Scotland. In 1771 he was employed as usher in London, and afterward became minister of an Independent chapel at Gosport, where he formed an institution for the education of young men for the Independent ministry. He then began the formation of the grand missionary scheme which afterward resulted in the London Missionary Society, and took an active part in the foundation of the British and Foreign Bible Society and the Religious Tract Society.

Bohe' mia, a province with the title of kingdom belonging to the Austro-Hungarian monarchy. Area 20,000 sq. mi.: pop. 5,837,603, of whom more than 2,000,000 are Germans, the rest mostly Czechs. The language of the country is the Czech dialect of the Slavonic. All sorts of grain are produced in abundance, as also large quantities of potatoes, pulse, sugarbeet, flax, hops, and fruits. The raising of sheep, horses, swine, and poultry is carried on to a considerable extent. The mines yield silver, copper, lead, tin, zinc, iron, cobalt, arsenic, uranium, antimony, alum, sulphur, plumbago, and coal. There are numerous mineral springs, but little salt. Spinning and weaving of linen, cotton, and woolen goods are extensively carried on; manufactures of lace, metal and wood work, machinery, chemical prodand work, beet-root sugar, pottery, porcelain, etc., are also largely developed. Large quantities of beer are exported. The glassware of Bo-hemia, which is known all over Europe, employs 50,000 workers. The largest towns are Prague, Pilsen, Reichenberg, Budweis, Teplitz, Aussig, and Eger. The educational establishments include the Prague university and upward of 4,000 ordinary schools. The

province sends 92 representatives to the Austrian Parliament; the provincial diet consists of 241 members.

Bohemia possesses a literature of considerable bulk, including in it also works written in Czech by Moravian and Hungarian writers. The earliest fragment is doubtfully referred to the tenth century, and it was not till after the thirteenth century that it attained to any development. The next century was a period of great activity, and to it belong versified legends, allegorical and didactic poems, historical and theological works, etc. The most flourishing period of the older literature falls within 1409-1620, John Huss (1639-1415) having initiated a new era, which, however, is more fertile in prose works than in poetry.

Bohemia was named after a tribe of Gallic origin, the Boii, who were expelled from this region by the Marcomans at the commence-ment of the Christian era. The latter were in turn obliged to give place to the Germans, and these to the Czechs, a Slavic race who had established themselves in Bohemia by the middle of the fifth century, and still form the bulk of the population. The country was at first divided into numerous principalities. Christianity was introduced about 900. In 1092 Bohemia was finally recognized as a kingdom under Wratislas II. In 1230 the monarchy, hitherto elective, became hereditary. The monarchs received investiture from the German emperor, held one of the great offices in the imperial court, and were recognized as among the seven electors of the empire. Frequently at strife with its neighbors, Bohemia was successively united and disunited with Hungary, Silesia, Moravia, etc., according to the course of wars and alliances. Ottokar II (1253-78) had extended his conquests almost from the Adriatic to the Baltic, when he lost them and his life in contest with Rudolph, the founder of the house of Hapsburg. After the close of the Przemysl dynasty (which had held sway for about six centuries) by the assassination of Ottokar's grandson, Wenceslas III, the house of Luxemburg succeeded in 1310, and governed Bohemia till 1437, the reign of Charles II (1346-78) being especially prosperous. Toward the close of this second dynasty civil wars were excited by the spread of the Hussite movement, the central figure of the struggle being John Ziska, the leader of the Taborites. A temporary union between the moderate Hussites and the Catholics having proved a failure, the reformed party elected as king, in 1433, the Protestant noble, George Podibrad. On his death in 1471 they chose Wladislas, son of Cassimir, king of Poland, who also obtained the crown of Hungary. His son Louis lost both crowns with his life in the battle of Mohacz against the Turks, and Ferdinand of Austria became in 1527 sovereign of both kingdoms. Bohemia then lost its separate existence, being declared a hereditary possession of the house of Austria; and its subsequent history pertains to that of the Austrian Empire. In 1848 an attempt was made to assert its ancient inde-

pendence against the Austrian dominion; a conflict took place, Prague was bombarded, and the insurrection suppressed.

**Bohemian Forest**, a mountain ridge extending from the Fichtelgebirge southward toward the confluence of the IIz and the Danube, and separating Bavaria from Bohemia. The highest peaks are the Arber (4,320 ft.) and the Rachel.

Bohemond, MARC (1056-1111), son of the Norman adventurer, Robert Guiscard, who rose to be Duke of Apulia and Calabria. Bohemond threw his energy into the Crusades. He took a leading part in the campaign in Asia Minor, captured Antioch (1098), and assumed the principality, but was taken prisoner in 1101 and held captive for two years.

**Bohn** (bon), HENRY GEORGE (1796-1884), English bookseller. He was the publisher of the well-known *Libraries*, or collection of standard works at moderate prices, to which he contributed some translations and works edited by himself.

**Bol'ars** (or Boy'ars), an order of the old Russian aristocracy next in rank to the ruling princes. The order was abolished by Peter the Great, who gave its members a place in the Russian nobility.

**Boil**, to heat a fluid up to the point at which is converted into vapor. The conversion it is converted into vapor. takes place chiefly at the point of contact with the source of heat, and the bubbles of vapor rising to the surface, and breaking there, produce the commotion called *ebullition*. At the ordinary atmospheric pressure ebullition commences at a temperature which is definite for each liquid. The escape of the heated fluid in the form of vapor prevents any further rise of temperature in an open vessel when the boiling point has been reached. The exact definition of the boiling-point of a liquid is "that temperature at which the tension of its vapor exactly balances the pressure of the atmosphere." The influence of this pressure appears from experiments. In an exhausted receiver the heat of the human hand is sufficient to make water boil; while, on the contrary, in Papin's digester, in which it is possible to subject the water in the boiler to a pressure of three or four atmospheres, the water may be heated far above the normal boiling point without giving signs of ebulli-From this relation between the ebullition. tion of a liquid and atmospheric pressure the heights of objects above sea-level may be calculated by comparing the actual boiling point at any place with the normal boiling point. The boiling point of water as marked on Fahrenheit's thermometer is 212<sup>o</sup>: on the Centigrade, 100°: on the Réaumur, 80°. Ether boils at about 96<sup>°</sup>, mercury at 662<sup>°</sup>.

**Boil**, a small, painful swelling of a conical shape on the surface of the body. Its base is hard, while its apex is soft and of a whitish color. Boils are generally indicative of depressed health, intemperate habits, or disorder of the digestive organs.

Boileau-Despréaux (bwä-lö-dā-prā-ō), NICH-OLAS (1636-1711), a French poet. He studied in the Collége d'Harcourt and in the Collége de Beauvais, and entered the legal profession, but soon left it to devote himself entirely to belles-lettres. In 1660 appeared his first satire, Adieux d'un Poete à la Ville de Paris, followed rapidly by eight others, and ultimately by three more, to complete the series. In 1664 he wrote his prose Dialogue des Heros de Roman. His epistles appeared at various times from 1669 onward. His masterpieces were the L'Art Poétique and Le Lutrin, published in 1674. In many respects his writings determined the trend of all subsequent French poetry, and he left, through his influence upon Dryden, Pope, and their contemporaries, a permanent mark upon English literature.

Boiler, a vessel constructed of wrought iron or steel plates riveted together, with needful adjuncts, in which steam is generated from water for the purpose of driving a steam engine, or for other purposes. The first important point in preparing a steam boiler is to secure strength to resist the internal pressure of steam and prevent explosions; and accordingly the globular or spherical shape was very early adopted as one of greatest capacity, and as a shape which was not liable to distortion by pressure. It was set over an open fire, and the steam was confined until it was raised by the heat to the required pressure. But the open fire was wasteful of fuel, and the next step was to enclose the globular boiler in brickwork. and conduct the flames in a flue winding round the boiler, in contact with it. The next form of boiler was the cylindrical, which stood upright like a bottle, the fire being placed at the bottom, and the flue winding round that part of the sides or walls of the boiler covered with water. For the sake of strength to resist the pressure of the steam, the bottom was hollowed or arched upward, and it presented a concave dome to the radiant heat of the fire and the impact of the flames; and the top was made hemispherical. In process of time boilers of much larger size came to be required, and the horizontal wagon-shaped boiler of James Watt was produced, and was succeeded by the cylindrical boiler having hemispherical ends, in which simplicity and strength of design for higher pressures were combined. This is a boiler that does not require any stays, and is valuable where there is plenty of room.

But, for the sake of economy of fuel as well as of space, one or two cylindrical flues are commonly constructed within the boiler, into which one flue tube is fixed traversing the boiler from end to end. The internal flue was first applied by James Watt. The burning gases from the fire after having traversed the bottom of the boiler, return through the internal flue to the front, where the current is divided, and returns toward the chimney along both sides of the boiler. In the Cornish boiler similarly constructed, the internal tube is made sufficiently large to receive the furnace inside the boiler; the boiler being "internally fired," in contrast with the other boilers which have been described, and are "under-fired." When two large furnace tubes for internal

firing are applied within the boiler it is known as the Lancashire boiler, and is the most generally prevailing type of boiler for purposes on land.

The shell of the boiler, or outer part, is of iron or steel plates. The steam chest or dome, on the upper side of the boiler, is a reservoir, whence the steam is supplied to the engine by the steam pipe, which is fitted with a stop valve. The *furnace* is the chamber for the combustion The flues or conduits for the of the fuel. burnt gases are either external or internal; cylindrical metal flues are flue tubes, and they are fixed at the ends into tube plates. The manhole is the entrance to the boiler for inspection, etc.; and it is closed by a manhole door or lid. Mudholes are placed at or near the bottom of the boiler, for the discharge of sediment, etc. The water is supplied by the feed apparatus; its level is indicated by a *float*. The water gauge also shows the level of the water; it may be a glass tube at the front of the boiler, connected to it by two horizontal tubes, one at the upper end and one at the lower end of the glass tube, or it may be a series of two or three gauge cocks, connected at different levels. The boiler is emptied by the blow-off cock; the surface of the water is cleared by the scum cock. Brine pumps may be used instead of blow-off cocks to draw off the brine from marine boilers. Surplus steam escapes by the safety values. Vacuum valces admit air into the boiler, when the pressure is less than that of the atmosphere. Fusible plugs are inserted in the boiler, over the fire, which melt and give vent to the steam when the pressure and temperature of the steam in the boiler become excessive and dangerous. The degree of pressure is indicated by the pressure gauge. The boiler is strengthened by stays, which may consist of rods, bolls, or gussets. The boiler is covered with clothing or cleading. The fire grate carries the fuel, and it consists of grate bar or fire bars, usually of cast iron, supported by crossbearers or bar frames. The mouthpiece is the entrance to the furnace, and it rests on the *dead plate.* The fire door or pair of fire doors are fitted to and hung by it. The *heating sur*face is the surface of the boiler exposed to the flame and burned gases from the furnace. The boiler room or internal capacity of the boiler is divided into the water room, occupied by water; and the steam-room, occupied by steam.

There are many varieties of boilers specially adapted to circumstances. The marine boiler is of the shape of a cheese, standing upright, containing the furnace tubes in the lower part, and small flue tubes — the multitubular flue — in the upper part. By inserting many small tubes in place of one or two large tubes, the body of water is subdivided, and the heat is effectively and rapidly distributed to the water. Locomotive boilers, also, are constructed with the multitubular flue, and the furnace or firebox, surrounded with water, is placed at one end. There are many forms of upright or vertical boilers, consisting of upright cylindrical shells, containing a fire-box at the lower part, from which the burned gases are carried up through a single, vertical flue, to the chimney above. In another form of upright boiler, cross water tubes are inserted in the upper part of the furnace, which absorb heat, both radiated and convected, and promote the circulation of the water in the boiler.

Boil'ing, in cookery, is one of the most frequent and important operations connected with the preparation of food. It is a process applicable to almost all varieties of food and every kind of culinary preparation, and the necessary appliances are simple and inexpensive. In the boiling of animal food, if it is desired to retain the nutritive juices within the substance, the meat to be boiled should be suddenly plunged entire into boiling water, and briskly boiled a few minutes. This coagulates the albuminous matter in the outer portions of the meat, and prevents the exudation of the fluid juices within. Thereafter the water should be maintained somewhat under the boiling point till the meat is sufficiently dressed, a period which varies according to the amount being operated on. By this means the meat is kept at once juicy, tender, and nutritious. The boiling of food starches such as arrowroot, corn flour, etc., ruptures the starch granules, and renders them digestible; and the same thing occurs in boiling meal, flour, and vegetables generally, which all contain starch in large proportions. Boiled food is more digestible than the same either roasted or stewed, but it wants the empyreumatic odor and sapidity communicated by these processes.

Bois de Boulogne (bwä-de-bö-lon), a pleasant grove near the gates on the w. of Paris, so named after the suburb Boulogne-sur-Seine. Its trees were more or less destroyed during the Franco-German War. It is still, however, one of the pleasantest Parisian holiday promenades.

Boisé City, capital of the state of Idaho. It is situated on the site of an old trading post of the Hudson Bay Company, 285 mi. n.w. of Salt Lake City; contains the state capitol, penitentiary, and U. S. assay office. Pop. 800.

**Bois-le-duc,** (bwä-li-duk), a fortified city, North Brabant, Holland, founded by Godfrey of Brabant in 1184; has manufactures of cloth, hats, cotton goods, etc., and a good trade in grain, its water traffic being equal to that of a considerable maritime port. The cathedral is considerable maritime port. The cathedral is one of the finest in the Netherlands. Pop. The Duke of York was defeated here 25,517. by the French in 1794.

Bojador', a cape on the West Coast of Africa, one of the projecting points of the Sahara; till the fifteenth century the southern limit of African navigation. The coast of the Sahara from Cape Blanco to this cape and a considerable portion of the interior has been proclaimed Spanish territory.

Bojol (bo-hol'), one of the Philippine Is-ands, n. of Mindanao, about 40 mi. by 30
mi. Woody and mountainous. Pop. 187.000.
Boker, GEORGE HENRY (1823-1890), American poet and man of letters. He published

several volumes of poems, notably war songs, and was the author of the tragedies of, Calaynos, Anne Boleyn, and Francesca da Rimini. In 1872 he became U. S. Minister at Constantinople; in 1876 was sent to St. Petersburg and remained there two years. His last literary work, a volume of sonnets, appeared in 1886. Of his war-poems the most famous is that of the Black Regiment, founded on an incident at Port Hudson.

**Bokhara** (Bochara) (bo-ha'-rå), a khanate of Central Asia, vassal to Russia. Area 100,000 sq. mi.; pop. 2,500,000. The only two towns of importance are the capital, Bokhara, and Karshi. The rule of the Emir is theoretically absolute. The manufactures are unimportant, but there is a very considerable caravan trade, cotton. rice, silk, and indigo being exported, and woven goods, sugar, iron, etc., being imported.

Bokhara was the ancient Sogdiana (or Maracanda), capital Samarkand; was conquered by the Arabs in the eighth century, by Genghis Khan in 1220, and by Timur in 1370, and was finally seized by the Usbeks in 1505. It has recently suffered much from the advances of the Russians, who, in 1868, compelled the cession of Samarkand and important tracts of territory. Since then the Emir Muzaffer-Eddin has sunk more and more into a position of dependency on Russia. After the Russian expedition to Khiva in 1873 an agreement was come to between Russia and Bokhara by which Bokhara received a portion of the territory ceded by Khiva to Russia, while the Russians received various privileges in return. Bokhara, the capital of the khanate, is 8 or 9 mi. in circuit, and surrounded by a mud wall. The trade was formerly large with India, but has been almost completely absorbed by Russia. Pop. 70,000.

**Boian' Pass**, a celebrated defile in the Hala Mountains, n.e. of Beluchistan, on the route between the Lower Indus (Scinde) and the table-land of Afghanistan. It is about 60 mi. long, hemmed in on all sides by lofty precipices, and in parts so narrow that a regiment could defend it against an army. It is traversed by the Bolan river. The crest of the pass is 5,800 feet high.

**Bolas** (that is, "balls"), a form of missile used by the Paraguay Indians, the Patagonians, and especially by the Gauchos of the Argentine Republic. It consists of a rope or line having at either end a stone, ball of metal, or lump of hardened clay. When used it is swung round the head by one end, and then hurled at an animal so as to entangle it.

**Bole**, an earthy mineral occurring in amorphous masses, and composed chiefly of silica with alumina, iron, and occasionally magnesia. It is of a dull yellow, brownish, or red color, has a greasy feel, and yields to the nail. In ancient times, under the name of Lemnian bole or earth, one variety of it had a place in the materia medica. At present the best known bole of commerce is a coarse pigment known as Berlin and English red.

Boler'o, a popular Spanish dance of the bal-

let class, for couples, or for a single female dancer. The music, which is in triple measure, is generally marked by rapid changes of time, and the dancers mostly accompany the music with castanets. The interest of these dances largely depends upon the pantomime of passion, which forms an essential part of them.

Boleyn (bul'in), ANNE (1501-1536), second wife of Henry VIII of England. She attended Mary, sister of Henry, on her marriage with Louis XII to France, as lady of honor, returning to England about 1522, and becoming lady of honor to Queen Catharine. The king, who soon grew fond of her, without waiting for the official completion of his divorce from Catharine, married Anne in January, 1533. having previously created her Marchioness of Pembroke. Then Cramner declared the first marriage void and the second valid, and Anne was crowned at Westminster with unparal-leled splendor. On Sept. 7, 1533, she became the mother of Elizabeth. She was speedily. however, in turn supplanted by her own lady of honor, Jane Seymour. Suspicions of infidelity were alleged against her, and in 1536 the queen was brought before a jury of peers on a charge of treason and impropriety of conduct. Smeaton, a musician, who was arrested with others, confessed, and on May 17 she was condemned to death. The clemency of Henry went no further than the substitution of the scaffold for the stake, and she was beheaded Whether she was guilty on May 19, 1536. or not has never been decided; that she was exceedingly indiscreet is certain.

Bo'lingbroke, HENRY ST. JOHN, Viscount (1678-1751), a famous English tory statesman of the eighteenth century. In 1701 he obtained a seat in the House of Com-mons, attaching himself to the Tories. He became secretary of war in 1706, though he retired with the ministry in 1708. In 1710 he became one of the secretaries of state. In 1712 he was called to the House of Lords by the title of Viscount Bolingbroke, and in 1713 concluded the Peace of Utrecht. Queen Anne made Bolingbroke prime minister, but died herself four days later. Bolingbroke, dismissed by King George while yet in Germany, fled to France in March, 1715, to escape the inevitable impeachment by which, in the autumn of that year, he was deprived of his peerage and banished. James III, the Pretender, invited him to Lorraine and made him his secretary of state. but dismissed him in 1716 on a suspicion of treachery. In 1723 he was permitted to return to England. He withdrew entirely from politics and spent the last years of his life in qui-etude at Battersea. Pope was indebted to him for suggestions for his Essay on Man. He was clever and versatile, but unscrupulous and insincere.

Bolivarey Ponte, SIMON (1783-1830), liberator and leader in the South American struggle for independence. He studied law in Madrid, and was married in 1801. Returning from Europe to South America (1809) he passed through the United States. He took part in

the revolutionary uprising in Caracas (April 19, 1810). After an unsuccessful attempt for Venezuelan independence (1811), B. went to Granada to operate against the Royalists. With his cousin, Rebas, he reached the Venezuelan border and kindled anew the fires of revolution. Jan. 13, 1813, he issued his famous proclama-tion of "war to the death." General Montverde was defeated by Rebas, General Bolivar entering Caracas in triumph, Aug. 4, 1814, proclaimed himself liberator and dictator. Caracas was retaken by the Royalists 1814. B. peaceably transferred the general government to Bogota and went to Kingston, Jamaica, (1815). His next victory was over Morillo at Barcelona (December, 1816). He fixed his head-quarters at Angostura (1817) and set out to effect a junction with Gamma Santandez who effect a junction with General Santander, who commanded the Republican forces in New Granada. He gained the splendid victory of Bojaca (Aug. 7, 1819), and was welcomed at Santa Fé as a deliverer. On Dec. 7, 1819, was promulgated the law uniting Venezuela and New Granada under the Republic of Colombia with B. as president. He practically ended the war in Venezuela when he defeated La Torre in the battle of Carabobo. B. entered Caracas (June 29, 1820), having for the third time rescued his native city from its oppressors. A constitution was adopted (Aug. 30, 1829), and B. elected president. The constitution of Bolivia, framed by Bolivar and presented to Congress, May 25, 1826, excited the fear that he wished to make himself perpetual dictator over united Colombia, Peru, and Bolivia. The Peruvians abjured the Bolivian code and organized a provisional government for them-selves. From 1828-1830 B. exercised supreme power in Colombia. One of the states or departments of Colombia is named after him Bolivar. Its area is 21,345 sq. miles; its pop. 24,400. Capital Carthagena.

Boliv'ia, formerly called Upper Peru, a republic of S. A. Area 567,360 sq. mi.; pop. 2,-300,000. An unascertained proportion of the inhabitants belong to aboriginal races (the Aymaras and the Quichuas); the larger portion of the remainder being Mestizos or descendants of the original settlers by native women. The largest town is La Paz, but the executive government has its seat at Sucre (or Chuquisaca); other towns are Potosi, Oruro, and Cochabamba. The broadest part of the Andes, where these mountains, encompassing Lakes Titicaca (partly in Bolivia) and Aullagas, divided into two chains, known as the Eastern and Western Cordilleras, lies in the western portion of the state. Here are some of the highest summits of the Andes, as Sorata, Illimani, and Sajama. The two chains enclose an extensive table-land, the general elevation of which is about 12,500 ft., much of it being saline and barren, especially in the s. The climate, though ranging between extremes of heat and cold, is very healthy, and cholera and yellow fever are unknown. The elevated regions are cold and dry, the middle temperate and delightful, the lower valleys and plains quite tropical. Among animals are the llama, alpaca, vicuña, chin-

chilla, etc.; the largest bird is the condor. Bolivia has long been famed for its mineral wealth, especially silver and gold, the total value of these metals produced between 1545 and 1875 being estimated at nearly \$2,000,000,-000. The annual produce is still several millions in value. The celebrated Potosi was once the richest silver district in the world. The country is capable of producing every product known to S. A., but cultivation is in a very backward state. Coffee, coca, cacao, tobacco, maize, and sugar-cane are grown, and there is an inexhaustible supply of india-rubber. The imports and exports are roughly estimated at about \$6,000,000 and \$9,000,000 respectively. The chief exports are silver (two thirds of the whole), cinchona or Peruvian bark, cocoa, coffee, caoutchouc, alpaca wool, copper, tin, and other ores. Roads are few and bad; and until these are improved and extended, railways built (there is one short line connecting La Paz with Titicaca and thus with the Peruvian Puno-Islay line), and the water communication by way of the Amazon and its tributaries taken advantage of, the trade must remain small. Accounts are kept in bolivianos or dollars, value about 83 cts.

By its constitution Bolivia is a democratic republic. The executive power is in the hands of a president elected for four years, and the legislative belongs to a congress of two chambers, both elected by universal suffrage. The The refinances are in a disorganized state. ligion is the Roman Catholic, and public worship, according to the rites of any other church is prohibited. Education is at an exceedingly low ebb. Bolivia under the Spaniards long formed part of the viceroyalty of Peru, latterly it was joined to that of La Platta or Buenos Ayres. Its independent history commences with the year 1825, when the republic was founded. The constitution was drawn up by Simon Bolivar, in whose honor the state was named Bolivia, and was adopted by congress. in 1826. It has since undergone important modifications. But the country has been almost continually distracted by internal and external troubles, and can scarcely be said to have had any definite constitution. It suffered severely in the war which, with Peru, it waged against Chile in 1879 and subsequent years, and which ended in a serious loss of territory; and also from a continued state of anarchy since the close of that war.

**Bologna** (bo-lön'ya), an important city of Italy, capital of the province of same name. It is the see of an archbishop, and has extensive manufactures of silk goods, velvet, artificial flowers, etc. Among the principal buildings are the Palazzo Pubblico, the Palazzo del Podesta; and the church or basilica of St. Petronio. Among the hundred other churches, S. Pietro, S. Salvatore, S. Domenico, S. Giovanni in Monte, S. Giacomo Maggiore, --all possess rich treasures of art. The leaning towers Degli Asinelli and Garisenda, dating from the twelfth century, are among the most remarkable objects in the city: and the market is adorned with the colossal bronze Neptune of

# **Bolor-Tagh**

Giovanni da Bologna. An arcade of 640 arches leads to the church of Madonna di S. Lucca, situated at the foot of the Apennines, near Bologna, and the resort of pilgrims from all parts of Italy. Bologna has long been re-nowned for its university, claiming to have been founded in 1038, and having a library, at one time in the care of Cardinal Mezzofanti, which numbers over 200,000 volumes and 9,000 The Instituto delle Scienze has a li-MSS. brary which numbers about 160,000 volumes, with 6,000 manuscripts. The Church of San Domenico has a library of 120,000 volumes. The Academy of Fine Arts has a rich collection of paintings by native artists, such as Francia, and the later Bolognese school, of which the Caraccis, Guido Reni, Domenichino, and Albano were the founders. Bologna was founded by the Etruscans under the name of Felsina; became in 189 B. c. the Roman colony Bononia: was taken by the Longobards about 728 A. D.; passed into the hands of the Franks, and was made a free city by Charlemagne. In the twelfth and thirteenth centuries it was one of the most flourishing of the Italian republics; but the feuds between the different parties of the nobles led to its submission to the papal see in 1513. Several attempts were made to throw off the papal yoke, one of which, in 1831, was for a time successful. In 1849 the Austrians obtained possession of it. In 1860 it was annexed to the dominions of King Victor Emmanuel. Pop. 142,460. The province of Bologna, formerly included in the papal territories, forms a rich and beautiful

Balance Area 1,390 sq. mi.; pop. 457,474. Bolor-Tagh (also Bilaur. or Belut Tagh), a mountain range formerly imagined to exist in Central Asia between Eastern and Western Turkestan as the axis of the continent. At that point, however, there is really a lofty table-land called the Pamirs.

**Bolton** (or Bolton-le-Moors), a manufacturing town of Lancashire, England, 10 mi. n. w. of Manchester. Its main growth has been of recent date, and in part due to the inventions of its residents Arkwright and Crompton. In manufacturing industries it is now surpassed by few places in Britain, and it contains some of the largest and finest cotton mills in the world. There are large engineering works, besides collieries, paper mills. foundries, chemical works, etc. Pop. 115,002.

**Bolt-ropes,** ropes used to strengthen the sails of a ship, the edges of the sails being sewn to them. Those on the sides are called *leech-ropes*, the others *head* and *foot ropes*.

**Boma**, a trading station on the right bank of the lower Congo River in Africa and seat of government of the Congo Free State.

**Bomarsund'**, a Russian fortress on the Aland Islands at the entrance of the Gulf of Bothnia, bombarded and forced to capitulate to the allied French and English in 1854 during the Crimean War, and then destroyed.

Crimean War, and then destroyed. **Bomb** (bom), a large, hollow iron ball or shell, filled with explosive material and fired from a mortar. The charge in the bomb is exploded by means of a fuse filled with pow-

# Bombay

der and other inflammable materials, which Tare ignited by the discharge of the mortar. Conical shells shot from rifled cannon have supplanted the older bomb. The use of bombs and mortars is said to have been invented in the middle of the fifteenth century.



#### Bombardier Beetles.

Bombardier Beetle, a name given to a species of beetle because of the remarkable power they possess of being able to defend themselves by expelling a pungent acrid fluid, which explodes with a pretty loud report on coming in contact with the air.

Bombay' (Portuguese, "good harbor"), chief seaport on the west coast of India, and capital of the presidency of the same name. Bombay has many handsome buildings, both public and private, as the cathedral, the university. the secretariat, the new high court, the post and telegraph offices, etc. Various industries. such as dyeing, tanning, and metal-working, are carried on, and there are large cotton factories. The commerce is very extensive, exa total value of over \$300,000,000 annually. The harbor is one of the largest and safest in India, and there are commodious docks. There is a large traffic with steam vessels between Bombay and Great Britain, and regu-lar steam communication with China, Aus-tralia, Singapore, Mauritius, etc. The island of Bombay, which is about 11 mi. long and 3 mi. broad, was formerly liable to be overflowed by the sea, to prevent which substantial walls and embankments have been constructed. After Madras, Bombay is the oldest of the British possessions in the East, having been ceded by the Portuguese in 1661. Pop. 821,-764

**Bombay'**, one of the three presidencies of British India. It is divided into a northern, a central, and a southern division, the Sind division, and the town and island of Bombay. The northern division contains the districts of Ahmedabad, Kaira, Panch Mahals, Broach, Surat, Thana, Kolába; the central, Khandesh, Nasik, Ahmednagar, Poonah, Sholapur, Satara; the southern, Belgaum, Dharwar, Kaladgi, Kanara, Ratnagiri. Total area 124, 192 sq. mi.; pop. 18,901, 123, including the city and territory of Aden in Arabia, 70 sq. mi. (pop. 34,860). The native or feudatory states connected with the presidency (the chief being Kathiawar) have an area of 73,753 sq. mi., and a population of 6,941,249. The climate varies, being unhealthy in the capital, Bombay, and vicinity,

but at other places, such as Poonah, very favorable to Europeans. The chief productions of the soil are cotton, rice, millet, wheat, barley, dates, and the cocoa-palm. The manufactures are cotton, silk, leather, etc. The great export is cotton. The administration is in the hands of a governor and council. The chief source of revenue is the land, which is largely held on the ryotwar system.

**Bombazine** (-zēn') is a mixed tissue of silk and worsted, the first forming the warp, and the second the weft. It is fine and light in the make, and may be of any color, though black is now most in use.

**Bona**, seaport and fortified city of Algeria, with manufactures of burnooses, tapestry, and saddles, and a considerable trade. Pop. 30,806. **Bonan'za** (Sp. "fair weather," "a favoring

**Bonan'za** (Sp. "fair weather," "a favoring wind"), a term applied in the U. S. to an abundance of precious metal or rich ore in a mine.

Bonaparte (bon'a pärt), the French form which the great Napoleon was the first to give to the original Italian name Buonaparte, borne by his family in Corsica. As early as the twelfth and thirteenth centuries there were families of this name in Northern Italy, members of which reached some distinction as governors of cities, envoys, etc. But the connection between the Corsican Bonapartes and these Italian families is not clearly established. though probably the former were descended from a Genoese branch of the family, which transplanted itself about the beginning of the sixteenth century to Corsica, an island then under the jurisdiction of Genoa. From that time the Bonapartes ranked as a distinguished patrician family of Ajaccio. About the middle of the eighteenth century there remained three male representatives of this family at Ajaccio, viz., the archdeacon Luciano Bonaparte, his brother Napoleon, and the nephew of both, Carlo, the father of the em-peror Napoleon I. Carlo or Charles Bonaparte, b. 1746, studied law at Pisa university, and on his return to Corsica, married Letizia Ramolino. He fought under Paoli for the independence of Corsica, but when further re-sistance was useless he went over to the side of the French, and was included by Louis XV amongst the 400 Corsican families who were to have rights in France as noble. In 1777 he went to Paris, where he resided for several years, procuring a free admission for his second son Napoleon to the military school of Brienne. He d. in 1785 at Montpellier. By his marriage with Letizia Ramolino he left eight children: Giuseppe (or Joseph) (see below), king of Spain; Napoleon I, emperor of the French (see Na*poleon I*); Lucien (see below), prince of Canino; Maria Anna, afterward called Elise, princess of Lucca and Piombino, and wife of Prince Bacciocchi (see Bacciocchi); Luigi (or Louis) (see below), king of Holland; Carlotta, afterward named Marie Pauline, princess Borghese (see Borghese); Annunciata, afterward called Caroline, wife of Murat (see Murat), king of Naples; and Girolamo (or Jerome) (see below), king of Westphalia.

Bonaparte, Elizabeth Patterson (1785-1879). Her father, William Patterson, emi-grated from Ireland to this country. At a ball in Baltimore, Miss Elizabeth Patterson met Jerome Bonaparte, a youth of nineteen, who had been serving in the French navy in the West Indies. He made a proposal of marriage, which she accepted. The marriage ceremony was performed in Baltimore, Dec. 24, 1803. Napoleon declared the marriage null and void, excluded Jerome from his dynasty, and threatened him with imprisonment unless he consented to repudiate his wife. In 1805 Jerome and Elizabeth embarked for Europe and arrived in Lisbon. She was not permitted to land, and leaving her, Jerome met Napoleon at Alessandria. The emperor declared that if Miss Patterson would return to the U.S., he would give her a pension of \$12-000. Her vessel went to Amsterdam, but was prevented from landing, and Mme. Bonaparte sought refuge in England, where her son. Jerome Napoleon Bonaparte, was b. at Cam-berwell, near London, 1805. Mme. Bonaparte returned to Baltimore. Mme. Bonaparte, although obtaining a divorce in the Maryland courts, employed every means to maintain the legality of her marriage, and the legitimacy of her son, but Jerome appealed to the counsel of state to forbid Jerome "Patterson" from calling himself Jerome Bonaparte. Louis XVIII invited Mme. Bonaparte to court. In 1819 she visited the Princess Borghese (Pauline Bonaparte) in Rome. She left a fortune of \$1,500,000 to her grandsons, Jerome Napo-leon Bonaparte, now in the French army, and Charles Joseph Bonaparte, a lawyer in Baltimore.

**Bonaparte**, JEROME (1784-1860), youngest brother of Napoleon I, b. at Ajaccio; at an early age entered the French navy as a midshipman. In 1801 he was sent out on an expedition to the West Indies, but the vessel, being chased by English cruisers, was obliged to put in to New York. During his sojourn in America Jerome Bonaparte became acquainted with Miss Elizabeth Patterson, and though still a minor, married her in spite of the protests of the French consul on Dec. 24, 1803. After considerable service both in the army and navy, in 1807 he was created king of Westphalia, and married Catherine Sophia, princess of Würtemberg. His government was not wise or prudent, and his extravagance and his brother's increasing exactions nearly brought the state to financial ruin. The battle of Leipsic put an end to Jerome's reign, and he was obliged to take flight to Paris. He remained faithful to his brother through all the events that followed till the final overthrow at Waterloo. After that, under the title of the Comte de Montfort, he resided in different cities of Europe, but latterly chiefly at Florence. After the election of his nephew, Louis Napoleon, to the presidentship of the French Republic, in 1848, he became successively gov-ernor general of Les Invalides, a marshal of France, and president of the senate. He died in 1860. Of Jerome Bonaparte's second mar-

#### Bonaparte

riage two children remain, Prince Napoleon Joseph, who assumed the name of Jerome, and the Princess Mathilde. From the marriage of Prince Napoleon, well-known by the nickname "Plon-Plon," with Clotilde, daughter of King Victor Emmanuel of Italy, were b. three children — Victor (b. July 18, 1862), Louis, and Marie, the first of whom since the death of Napoleon III's son, the Prince Imperial, is generally recognized by the Bonapartist party as the heir to the traditions of the dynasty. Both had to leave France in 1886, a law being passed expelling pretenders to the French throne and their eldest sons.

Bonaparte, JOSEPH (1768-1844), the eldest brother of Napoleon I, was b, in Corsica, educated in France at the college of Autun, returned to Corsica in 1785, on his father's death, studied law, and in 1792 became a member of the new administration of Corsica under Paoli. In 1793 he emigrated to Marseilles, and married the daughter of a wealthy banker named Clari. In 1796, with the rise of his brother to fame after the brilliant campaign of Italy, Joseph began a varied diplomatic and military career. At length in 1806, Napoleon, having himself assumed the imperial title in 1804, made Joseph king of Naples, and two years afterward transferred him to Madrid as king of Spain. His position here, entirely dependent on the support of French armies, became almost intolerable. He was twice driven from his capital by the approach of hostile armies, and the third time, in 1813, he fled, not to re-After Waterloo he went to the U.S., turn. and lived for a time near Philadelphia, assum-ing the title of Count de Survilliers. He subsequently went to England, finally repaired to Italy, and died at Florence.

**Bonaparte**, LETIZIA RAMOLINO (1750-1836), the mother of Napoleon I, and, after Napoleon's assumption of the imperial crown, dignified with the title of Madame Mère, was b. at Ajaccio, and was married in 1767 to Charles Bonaparte. She was a woman of much beauty, intellect, and force of character. Left a widow in 1785, she resided in Corsica till her son became first consul, when an establishment was assigned to her at Paris. On the fall of Napoleon she retired to Rome, where she died.

Napoleon she retired to Rome, where she died. Bonaparte, LOUIS (1778–1846), second younger brother of the Emperor Napoleon I, and father of Napoleon III, was b. in Corsica. He was educated in the artillery school at Chalons, accompanied Napoleon to Italy and Egypt, and subsequently rose to the rank of a brigadier general. In 1802 he married Hortense Beauharnais, Josephine's daughter, and in 1806 was compelled by his brother to accept, very reluctantly, the Dutch crown. He exerted himself in promoting the welfare of his new subjects, and resisted as far as in him lay the tyrannical interference and arbitrary procedure of France; but disagreeing with his brother in regard to some measures of the latter, he abdicated in 1810 and retired to Grätzunder the title of the Count of St. Leu. He d. at Leghorn. He was the author of several works which show considerable literary ability. Bonaparte, Louis. See Napoleon III.

Bonaparte, LUCIEN (1775-1840), Prince of Canino, next younger brother of Napoleon I. was b. at Ajaccio. He emigrated to Marseilles in 1793, and having been appointed to a situation in the commissariat at the small town of St. Maximin in Provence, he married the innkeeper's daughter. Here he distinguished himself as a republican orator and politician, and was so active on this side that after Robespierre's fall he was in some danger of suffering as a partisan. His brother's influence, however, operated in his favor, and in 1798 we find him settled in Paris and a member of the newly elected Council of Five Hundred. Shortly after Napoleon's return from Egypt in 1799 he was elected president of the Council, in which position he contributed greatly to the fall of the Directory and the establishment of his brother's power, on the famous 18th Brumaire (Nov. 9). Next year. as Napoleon began to develop his system of military despotism, Lucien, who still held to his republican principles and candidly expressed his disapproval of his brother's conduct, fell into disfavor and was sent out of the way as ambassador to Spain. Eventually, when Napoleon had the consulate declared hereditary, Lucien withdrew to Italy, settling finally at Rome, where he devoted himself to the arts and sciences, and lived in apparent indifference to the growth of his brother's power. In vain Napoleon offered him the crown, first of Italy and then of Spain; but he came to France and exerted himself on his brother's behalf, both before and after Waterloo. Returning to Italy, he spent the rest of his life in literary and scientific researches. Pope Pius VII made him prince of Canino. He was the author of several works, among which are two long poems. His eldest son, Charles Lucien Laurent Bonaparte (1803-1857). achieved a considerable reputation as a natu-ralist, chiefly in ornithology. He published ralist, chiefly in ornithology. He published a continuation of Wilson's Ornithology; Icono-grafia della Fauna Italica; Conspectus Generum Arium, etc. Another son, Pierre (1815-1881), led an unsettled and disreputable life, and became notorious in 1870 by killing, in his own house at Paris, the journalist Victor Noir, who had brought him a challenge. He got off on a plea of self-defense, but had to leave France.

Bonaparte, NAPOLEON. See Napoleon I.

**Bond**, an obligation in writing to pay a sum of money, or to do or not to do some particular thing specified in the bond. The person who gives the bond is called the obligor, the person receiving the bond is called the obligee. A bond stipulating either to do something wrong in itself or forbidden by law, or to omit the doing of something which is a duty, is void. No person who cannot legally enter into a contract, such as an infant or lunatic, can become an obligee. No particular form of words is essential to the validity of a bond. A common form of bond is that on which money is lent to some company or corporation, and by which the borrowers are bound to pay the lender a certain rate of interest for the money. Goods liable to customs or excise duties are said to be *in bond* when they are temporarily placed in vaults or warehouses under a bond by the importer or owner that they will not be removed till the duty is paid on them. Such warehouses are called *bonded* warehouses.

Bone, a hard material constituting the framework of mammalia, birds, fishes, and reptiles, and thus protecting vital organs such as the heart and lungs from external pressure and injury. In the fetus the bones are formed of cartilaginous (gristly) substance, in different points of which earthy matter-phosphates and carbonates of lime - is gradually deposited till at the time of birth the bone is partially formed. After birth the formation or bone continues, and, in the temperate zones, they reach their perfection in men between the ages of twenty and twenty-five. From this age till fifty they change but slightly; after that period they grow thinner, lighter, and more brittle. Bones are densest at the surface, which is covered by a firm membrane called the *periosteum;* the internal parts are more cellular, the spaces being filled with marrow, a fatty tissue, supporting fine bloodvessels. Bone consists of nearly 34 per cent. organic material and of 66 per cent. inorganic substances, chiefly phosphate, carbonate, and fluoride of lime and phosphate of magnesium. The organic material is converted into gelatin by boiling. It is this which makes bones useful for yielding stock for soup. The inor-ganic substances may be dissolved out by steeping the bone in dilute hydrochloric acid. Bones, from the quantity of phosphates they contain, make excellent manure. The value of bones as manure arises chiefly from the phosphates and nitrogenous organic matters they contain; and where the soil is already rich in phosphates bone is of little use as ma-It is of most service therefore where nure. the soil is deficient in this respect, or in the case of crops whose rapid growth or small roots do not enable them to extract a sufficient supply of phosphate from the earth,-turnips, for instance, or late-sown oats and barley. There are several methods for increasing the value of bones as manure, by boiling out the fat and gelatin, for instance, the removal of which makes the bones more readily acted on by the weather and hastens the decay and distribution of their parts, or by grinding them to dust or dissolving them in sulphuric acid, by which latter course the phosphates are rendered soluble in water. Before being utilized in agriculture they are often boiled for the oil or fat they contain, which is used in the manufacture of soap and lubricants.

**Bone-ash** (bone-earth), the earthy or mineral residue of bones that have been calcined so as to destroy the animal matter and carbon. It is composed chiefly of phosphate of lime, is used for making cupels in assaying, etc.

Bone black, ivory black, or animal charcoal, is obtained by heating bones in close retorts till they are reduced to small, coarse grains of a black carbonaceous substance. This possesses the valuable property of arresting and absorbing into itself the coloring matter of liquids which are passed through it. Hence it is extensively used in the process of sugar-refining, when cylinders of large dimensions filled with this substance are used as filters. After a certain amount of absorption the charcoal becomes saturated and ceases to act. It has then to be restored by reheating or other methods. Bone black has also the property of absorbing odors, and may thus serve as a disinfectant of clothing, apartments, etc.

**Boneset** (or thoroughwort), a useful annual plant, indigenous to America, and easily recognized by its tall stem, 4 or 5 ft. in height, passing through the middle of a large, double, hairy leaf, and surmounted by a broad, flat head of light purple flowers. It is much used as a domestic medicine in the form of an infusion, having tonic and diaphoretic properties.

**Bonham**, Fannin co., Tex., on Bois de Arc Creek, 70 mi. n. e. of Dallas. Railroad: Texas & Pacific. Industries: oil mines, 2 flouring mills. 2 ice factories, carriage and wagon, and a mattress factory. The town was first settled in 1837 and was called Old Fort Inglish, a fort having been built here to protect the settlers against the Indians. Bonham became a city in 1880. Pop. est. 1897, 5.500.

**Bonheur** (bo-neur), ROSA, b. 1812; a distinguished French artist and painter of animals. When only eighteen years old she exhibited two pictures, *Goats and Sheep*, and *Two Rabbits*, which gave clear indications of talent. Since that time a long list of pictures, *Tillage in Nivernais* (1849), *The Horse Fair* (1853), *Haymaking* (1865), etc., have made her name famous throughout Europe.

**Bonifaccio** (bō-nē-fách 'ō), a seaport in Corsica, on the strait of same name, which separates Corsica from Sardinia. Wine and oil are exported, and a coral fishery is carried on. Pop. 3,594. The Strait of Bonifaccio is 7 mi. broad, and contains several small islands.

Bon' iface. Nine popes have been so named, of whom only three are conspicuous in history. B. I (418-422), memorable as the earliest bishop of Rome who assumed the title of the first bishop of Christendom. B. VIII (1228-1303). In 1281 he was raised to the cardinalate, and was elected pope Dec. 24, 1294, when the kings of Hungary and Sicily held his bridle reins as he rode to the Lateran, and waited on him at table, wearing their crowns. The great principle of B.'s policy was to assert papal supremacy over states as well as over the church. There was hardly a question in which B. did not interfere. In the Scoto-English wars, in the affairs of Sicily, Denmark, Germany, Bohemia, etc., we see him meddling. His simony was well known, and he has found an unenviable immortality in Dante's Inferno. Β. IX (1389-1404). He practised simony without concealment or restriction; trafficked in indulgences and dispensations; overawed Rome by fortresses; and to protect himself against the enemies whom his imperious spirit had raised against him, he had to purchase the

services of powerful allies by granting them as flefs portions of the patrimony of the church.

**Boniface,** ST. (680-755), the apostle of Germany, whose original name was Winfrid, was b. in Devonshire of a noble Anglo-Saxon family. In histhirtieth year he took orders as a priest. In 723 he was made a bishop, and in 732 an archbishop and primate of all Germany. He was slain in West Friesland by some barbarians, and was buried in the abbey Fulda.

**Bonito** (bo  $n\bar{e}$  'to), a name applied to several fishes of the mackerel family, one of which, the bonito of the tropics, or stripe-bellied tunny, is well known to voyagers from its persistent pursuit of the flying-fish. It is a beautiful fish, steel blue on the back and sides, silvery on the belly, with four brown longitudinal bands on each side. It is good eating, though rather dry.

Bon Marché, an immense retail store in Paris on the Rue du Bac. About 3,000 persons are employed in the store and the annual business amounts to about \$30,000,000. It was founded in 1852 by M. Jacques Boucicaut, who introduced the system of sharing the profits with the employees. Madame Boucicaut carried on the business after the death of her husband, and instituted a retiring fund for the old employees. The business is now in the hands of a joint stock company.

Bonn, an important German town in Rhenish Prussia, situated on the left bank of the Rhine. It has some trade and manufactures, but is chiefly important for its famous university founded in 1777 by Elector Maximilian Frederick of Cologne. Enlarged and amply endowed by the king of Prussia in 1818, it is now one of the chief seats of learning in Europe, with a library of more than 200,000 volumes, an anatomical hall, mineralogical and zoological collections, museum of antiquities, a botanical garden, etc. The teachers in the five faculties are above a hundred, and the students number about 1,100. Lane, Niebuhr, Ritschl, Brandis, and other names famous in science or literature are connected with Bonn. and Beethoven was b. there. Bonn was long the residence of the electors of Cologne, and finally passed into the hands of Prussia by the arrangements of the Congress of Vienna in 1815. Pop. 39,805.

**Bonner**, ROBERT (1824-), American publisher, b. near Londonderry, Ireland, came to the U. S. when a boy, and became a compositor in Hartford, Conn. In 1844 he went to New York, and in 1851 purchased the New York *Ledger*, which he built up to a great circulation. He had a fondness for fast horses, although he refused to let them race; and owned Maud S. and Dexter. Of late years Mr. Bonner has devoted himself to treatises on the diseases of the horse's hoof.

**Bonnet-rouge** (bo-nā-rözh; Fr. "red-cap"). the emblem of liberty during the French Revolution, and then worn as a head-dress by all who wished to mark themselves as sufficiently advanced in democratic principles; also called *cap of liberty*.

Bonnivard (bon-ē-vär), FRANÇOIS DE (1496-

1570), the "prisoner of Chillon," of Byron's famous poem. An ardent republican, he took the side of the Genoese against the pretensions of the dukes of Savoy. In 1530 he fell into the hands of the duke, and was imprisoned till 1536 in the castle of Chillon, when the united forces of the Genevese and the Bernese took Chillon.

**Bonny**, a river of Western Africa, one of the mouths of the Niger, where a considerable trade is done.

**Bon'tebok**, the pied antelope of South Africa, with white markings on the face. allied to the blesbok.

**Bonus**, something given over and above what is required to be given, especially an extra dividend to the shareholders of a jointstock company, holders of insurance policies, etc., out of accrued profits.

Bony Pike (or gar-fish), a remarkable genus of fishes inhabiting North American lakes and rivers, and one of the few living forms that now represent the order of ganoid fishes so largely developed in previous geological epochs. The body is covered with smooth enameled scales, so hard that it is impossible to pierce them with a spear. The common gar-fish attains the length of five feet, and is easily distinguished by the great length of its jaws. See Gar-fish.

**Bonzes**, the name given by Europeans to the priests of the religion of Fo (or Buddha) in Eastern Asia, particularly in China, Burmah, Tonquin, Cochin-China, and Japan. They do not marry, but live together in monasteries. There are also female bonzes, whose position is analogous to that of nuns in the Roman Catholic church.

**Booby**, a swimming bird nearly allied to the gannet, and so named from the extraordinary stupidity with which, as the older voyagers tell, it would allow itself to be knocked on the head without attempting to fly. The



booby lives on fish, which it takes, like the gannet, by darting down upon them when swimming near the surface of the water.

**Book,** the name applied to a printed composition forming a volume. The tree is sometimes called the parent of the book, as the words from which the name is derived mean tree. The earliest writings were upon monu-

ments, chosen because they would last longest. The idea of perpetuity in architecture is found in the pyramids; in the two columns mentioned by Josephus, one of stone, the other of brick, on which the children of Seth wrote their inventions and astronomical discoveries; in the pillars of Crete; in the leaden tablets containing the works of Hesiod; in the commandments of stone delivered to Moses; and in the laws of Solon inscribed on planks of wood. The notion of a literary production surviving the materials on which it was written was unknown before the discovery of substances for systematic transcription. Tablets of ivory or metal were in common use among the Greeks When made of wood, someand Romans. times citron, but usually of beech or fir, their inner sides were coated with wax on which the letters were traced with a pointed pen or stylus, one end of which was used for erasure. It was with his stylus that Cæsar stabbed Cassius in the arm when attacked by his murderers. Two such tablets joined together at the back with wires which act as hinges, furnish our earliest specimen of book-binding. A raised margin was left around the pages to prevent rubbing. The oldest specimen of these tablets is found in the museum at Florence and belongs to the year 1301.

The leaves of the palm, the inner bark of lime, ash, maple, and elm were all used in-stead of tablets. The earliest flexible material of importance was the inner part of the Egyptian papyrus, from which is derived our word paper. The length of the papyri is from eight to sixteen inches, although some have been found as long as thirty-two. They were written on with reeds dipped in gum-water, colored with soot of resin. The writing could be obliterated easily with a sponge. It is worthy of note that our printer's ink of to-day is made principally of the same material, oil and resin. The papyri were sometimes coated with a wash or varnish. Pliny mentions the ink of the cuttlefish, and also a decoction of lees of wine for writing. Red ink consisted of a preparation from cinnabar. The next material employed was a parchment made from the skins of the sheep or lamb. Vellum, a finer substance, was made from calfskin. Writing on skins is mentioned by Herodotus. The parchment superseded the use of papyrus about the seventh century. At first parchment was written on one side only and the other side stained; afterward it was written on both sides. Its costliness in classical times led to the practise of erasing the original writing for the purpose of substituting new.

Paper made from cotton came into use about the end of the ninth century, and opportunely checked the total destruction of old manuscripts, which the scarcity of parchment and demand for books of devotion threatened. Cicero's *De Republica* was discovered in the Vatican library written under a commentary of St. Augustine on the *Psalms*, and other valuable writings were discovered in the same manner. The invention of linen paper gave the first real impetus to book production. This

date is disputed but is about 1300. The invention is credited by various writers, to the Germans, Italians, the Greeks, Chinese, and the Saracens in Spain. The form of ancient books differed with the material used. Flexible material was rolled upon a staff as are our maps of to-day; the pieces of parchment or papyrus being joined together, the complete roll was called a volumen, hence our volume. Ovid speaks of his fifteen books as so many volumen, as too bulky to be rolled upon one stick. The title was either written upon the outside or suspended like a ticket from the roll. The volumen usually contained much less matter than is in the ordinary octavo book of to-day. The libraries or rooms in which the rolls were kept were lined with shelves, and the rolls were laid horizontally upon them. Copyists were employed to write the books which the spread of civilization demanded, and the prices for loan or purchase were exorbitant. A catalogue of the books in the Sarabone in Paris, in 1792, consisting of 1,000 volumes, was valued at \$19,000, and the French library of 825 volumes sent to England in 1425 was valued at \$11,115. The sizes of early printed books were usually quarto or folio on account of the large type used when the art of printing was in its infancy. The size of a book was taken from the dimensions of the paper and the number of leaves into which it was folded. The ordinary sizes were royal, the largest demy and crown. A sheet of royal (about 19x24 inches) folded in the center making two leaves (four pages) was a royal folio, if folded a second time, making four leaves each 94 x 12 inches (eight pages) it was a royal quarto, if folded again making eight leaves  $6 \times 9\frac{1}{2}$  inches (16 pages) it was a royal octavo. The number of leaves was represented by the folio, quarto, or octavo, and the size of the page by the size of the paper, that is, royal, demy, or crown. At this time the sizes of both paper and press were limited, and these terms were explicit; but with improvements in machinery, which made larger sheets of paper and power presses possible, the terms, octavo, quarto, etc., are almost meaningless as far as designating the size of the book is concerned. In England the sizes are still expressed as above, but in our country the size in inches is given by most publishers. If you wish to determine what size the book is, count the number of leaves, not pages, from the binder's thread, in the middle of the sheet to the next This rule will not apply, however, to like one. old black-letter books.

**Bookbinding** is the art of fastening together the sheets of a book and enclosing them in cases of binder's board covered with leather, cloth, or other material to protect them while in use. When books were rareties and expensive on account of the patient labor of copying or the slow productions of the printing press during the infancy of typography, they were very highly prized, and as much labor was expended in the binding as would build a house to-day. The wooden cover of a book with its metal hinges, bosses, guards, and clasps, seems in all but dimensions fit for a church door: but

# Bookbinding

the improvement in all mechanical arts, the extension of education to all classes and consequent demand for books, has led to radical changes in the art of bookbinding. From the fifth to the end of the fifteenth century books were exceedingly rare and costly, and few bindings illustrating the art during the Dark Ages have been preserved. From the patient tasks of slaves during the Roman Empire, the transcribing of books became the duty of monks, who copied and bound the works, which were among their chief treasures. The monastic bindings were thick, heavy, solid, and, according to our ideas, clumsy. Books for common use were encased in boards covered with leather, with metallic bosses, corner plates, and clasps. The literary treasures of kings and the church were encased with ivory sides and carved with appropriate designs. Silver and gold were gems and jewels, and encased in boxes or cases also richly adorned. Silk and velvet for



Byzantine Style of Bookbinding.

binding came into use about the time of the Renaissance. Thin sides covered with leather, parchment, and vellum came into use with the invention of printing. LeGascon, Gibson, and Roger Payne among others have left behind works of art in bindings which are much sought after by book-lovers of to-day. The operations of bookbinding are now carried on upon a scale which could not have been thought of at the beginning of this century. Then the only machine necessary was a small but powerful screw press. To-day improved machinery is used for every possible operation, the former labor of weeks has become a matter of hours, and the elaborate binding of the last century is almost a lost art.

Modern bookbinding is divided into two principal branches, leather work and cloth casing. The sheets of an octavo book are

# Bookbinding

usually printed with 32 pages on each side and delivered to the binder flat. The sheets with the pages from 1 to 32 upon them, duplicated upon each side, are piled upon the feed table of the folding machine, which rises automatically as the sheets are fed into it. Each sheet is picked up by an automatic feeder and pushed into the folder. It is straightened by contact with a gauge, and a dull blade descends upon the center of the sheet, the long way, and pushes it down between two rollers which pinch it together, folding it in the center. The sheet is carried forward on endless tapes and cut in two by a revolving knife. These pass under another blade similar to the first, and a second fold and cut is made, the sheet descending with the width of the rollers at each operation. Here the sheets separate, two going to the right and two to the left. The third rollers, set at right angles to the first, are passed in like manner, and the four pieces with 16 pages properly folded are dropped into wooden holders and carried to tables near by. When the sheets of the entire book are folded, they are laid upon a revolving table, each 16 pages (or section as it is usually called) in a pile. The belt is thrown on and the table revolved. The girls seated along the side pick off each section as it passes and when one revolution of the table is made. they have sheets for a complete book in their hands. This is called "gathering." Other girls grasp the gathered book at the front and run over the sections rapidly, watching the signature number on the bottom of the first page of every 16-page section, to guard against omissions or duplications. This is called "collating." The sheets are then carried to a large, heavy press constantly opening and closing, called a smasher, and the loose, bulky sheets are pressed into compact form. The books next go to the sewing machines, which are marvels of ingenuity, and are described under that head. When the book is sewed it is returned to the smasher, and again passed through, then goes to the lining-up table, when the end sheets are tipped on to the front and last sections, and the book goes to the cutting machine. The books are placed back to back upon a revolving table, and a knife descends cutting the edges, one edge at a time, as the table is turned around. The book is then ready to have the edges either sprinkled, colored, marbled, or gilded. Sprinkling is done by mixing the desired colors with a thin paste or size, and spattering it on to the edges of the books by passing a stiff brush dipped into the mixture over a sieve. In uniform coloring the books are put into a press and the coloring matter applied with a sponge. Marbling is a separate trade and requires consider-able skill. The different colors are thrown with a brush into a shallow trough filled with prepared gum-water and float upon the surface usually in the form of spots. To make a wave pattern a stick is drawn from side to side of the trough and the colors follow the motion of the stick. If a comb pattern is desired the stick is followed by a comb drawn through the

trough from end to end. When the proper pattern is formed upon the mixture, the edges of the book are dipped into it, and upon removal the colors adhere to the edge of the book. After one dip, the colors are removed, and the operation is again repeated. In gilding, the front edge is first operated on. The books are fastened into a large laying press and the edges scraped smooth with a flat, steel knife, and a mixture of white of egg and water, called glaire, is spread on with a camel's hair brush. The gold leaf is laid on. When the covered edge becomes dry, it is rubbed with bloodstone and agate burnishers. The top and bottom edges are then treated in the same way. Gilt edges in early books had designs pressed upon them (gaffre), but very little such work is now done. The book then goes to the forwarder. It is straightened up and the back glued. When dry it is rounded by beating on the back with a hammer. It is then placed between the jaws of a roller-backer which press it very tight, and a roller is passed back and forth over the back, which forms the joint for the boards to flt into. The boards, which are then laced on, fit into these grooves. The back is then covered with glue, and a thin piece of cloth, projecting over the sides about an inch, is put on. A strip of paper, almost the length of the book, and double the width, is then glued on to one side, and the back is covered with it and the other edge turned back. This forms what is usually, though improperly, termed a spring back. This serves to strengthen the book. The board used to cover the sides is received from the mill in large sheets, and is cut into strips, by rotary knives adjusted to the proper width, and then trimmed in the same manner to the required length. These are next fastened to the book by lacing the cords back and forth through the board, and the ends are opened out and beaten down. The book is then placed in press until it is thoroughly dry. The materials for covering are very numerous. Skins of the calf, kid, sheep, goat, and cow are all used. Some are dyed with various colors and grained to represent different patterns. The leather, cut to the size wanted, is beveled on the edges by passing through a machine cov-ered with sandpaper fastened upon a roller which revolves at a speed of about 2,500 revolutions a minute. It is then moistened with water, covered on the inside with paste or glue and is pulled tight over the back of the book and the edges turned in by the forwarder, and concealed from view by the end sheets, which are afterward pasted to the board. After thoroughly drying, the book is ready for the finisher who washes the back with thin paste, and covers it with two coatings of glaire. When dry the gold leaf is laid on and the lettering stamped with hot, brass type. Other gold work, such as ornaments or rolls, is applied in the same manner. The superflu-ous gold is cleaned off and the back polished with a hot iron. The end sheets are then pasted up and the book placed in press until dry, when it is wrapped ready for delivery.

# Bookkeeping

In cloth work the operation is the same up to the time the edges are finished; the case, however, is made by the case-makers apart from the book. The boards and cloth cut to the proper size are laid in a pile. The cloth is glued upon the wrong side and the board laid into the right angles of a gauge which is set to the thickness of the back of the book. The edges of the cloth are then turned in, the space for the back is lined with a strip of paper, the case run through between rollers to smooth it, and it is then laid out to dry. The cases are then taken to the embossing room, where they are finished. This is done by a large, heavy stamping press. If the design is in several colors of ink a brass die for each color is required. This is placed in the press, heated by gas or steam and the design blended or creased into the cloth. Afterward the same design and press, cold, is used for inking each color of ink, passing through the press twice. If gold or other metal is used, the case is sized with a powdered albumen, the leaf of metal is laid on, and the heated design is stamped in by the press. The surplus metal is brushed off. and the case is ready for the inside of the book which has been working its way through the bindery. The books are piled upon a table, the sides covered with paste and passed to a workman who places them properly in the case. They are then placed into the large standing presses. A board with a projecting brass edge is fitted into the hinge between each layer of books. Here they dry under a pressure of about two tons to the square inch. The books are then sent to the shipping room for wrapping and delivery.

Bookkeeping is the art or method of recording mercantile or pecuniary transactions, so that at any time a person may be able to ascertain the details and the extent of his business. It is divided according to the general method pursued, into bookkeeping by single or by double entry. Bookkeeping by single entry is comparatively little used, except in retail businesses of small extent, where only the simplest record is required. In its simplest form debts due to the trader are entered in the day-book at the time of the transaction to the debit of the party who owes them; and debts incurred by the trader to the credit of the party who gave the goods. From this book the accounts in a summarized form are transferred to the ledger, where one is opened for each different person, one side being for Dr., and the other for Cr. When a balance-sheet of the debts owing and owed is made, this. together with stock and cash in hand, shows the state of the business.

Bookkeeping by double entry, a system first adopted in the great trading cities of Italy, gives a fuller and more accurate record of the movement of a business, and is necessary in all extensive mercantile concerns. The chief feature of double entry is its system of checks, by which each transaction is twice entered, to the Dr. side of one account and then to the Cr. side of another. An important feature of the system consists in adopting, in addition to the

22
### Bookkeeping

personal accounts of debtors and creditors contained in the ledger, a series of what are called book accounts, which are systematic records in the form of debtor and creditor of particular classes of transactions. For every debt incurred some consideration is received. This consideration is represented under a particular class or name in the ledger, as the debtor in the transaction in which the party from whom the consideration is received is the creditor. Thus A buys goods to the value of \$500 from B. He enters these in his journal—Stock Acct. Dr. \$500 (for goods purchased) To B, \$500. The first \$500 appears in the Dr. column of the journal, and is posted in the ledger to the debit of Stock Account; the second appears in the Cr. column, and is posted in the ledger to the Cr. of B. In like manner, when the goods are paid, Cash, for which an account is opened in the ledger, is credited with \$500, and B is debited with the same. When the goods are sold (for cash) Stock is credited, and Cash is debited. If the amount for which they sell is greater than that for which they were bought, there will be a balance at the debit of Cash, and a balance at the credit of Stock. The one balance represents the cash actually on hand (from this transaction), the other the cause of its being on hand. If there is a loss on the transaction, the balance will be on the other side of these accounts. Ultimately the balance thus arising at Dr. or Cr. of Stock is transferred to an account called Profit and Loss, which makes the stock account represent the present value of goods on hand, and the profit and loss account, when complete, the result of the business. In this system the risk of omitting any entry, which is a very common occurrence in single bookkeeping, is reduced to its smallest, as unless a particular transaction is omitted in every step of its history, the system will inexorably require that its whole history should be given to bring the different accounts into harmony with each other.

In keeping books by double entry, the books composing the set may be divided into two classes, called principal and subordinate books. The subordinate books are those in which the transactions are first recorded, and vary both in number and arrangement with the nature of the business and the manner of recording the facts. The most important of these (all of which are not necessarily to be found in the same set) are Stock Book, Cash Book, Bill Book, Invoice Book, Account Sales Book. The principal books are made up exclusively from the subordinate books and classified documents of the business. In the most perfect system of double entry they consist of two, the Journal and Ledger. The journal contains a periodical abstract of all the transactions contained in the subordinate books, or in documents not entered in books, classified into debits and credits. The ledger contains an abstract of all the entries made in journal classified under the heads of their respective accounts. It is an index to the information contained in the journal, and also a complete abstract of the actual state of all accounts,

but gives no further information; while the journal gives the reason of each debit and credit, with a reference to the source where the details of the transaction are to be found.

Book-trade, the production and distribution of books commercially. Even in ancient times, before the invention of printing, this trade had attained a high degree of develop-ment at Alexandria, and later at Rome. Copies of books were readily multiplied in those times, as we hear of as many as a thousand slaves being employed at one time in writing to dictation. After the fall of Rome down to the twelfth century, the trade in books was almost entirely confined to the monasteries. But with the rise of the universities the trade received a new development, and in all university towns booksellers and book agents became numerous. The invention of printing had a powerful effect on the trade of bookselling. The printers were originally at the same time publishers and booksellers, and they were in the habit of disposing of their books at the chief markettowns and places frequented by pilgrims.

For the most part these two departments of the trade are carried on separately, but it is not uncommon for them to be united. Very frequently books are printed at the cost of the author or some learned society, and published on commission. The publisher brings himself into connection with the retail booksellers, who are the direct means of distributing the book to the public. Second-hand booksellers belong to a special department of the retail book-trade. The book-trade of North America, the chief seats of which are Chicago, New York, Philadelphia, and Boston, is now very large. Canada and Australia are also developing a considerable business of this kind. The largest bookselling business in the world is in Australia, in the city of Melbourne. This store has over a million books in stock. The shelves are crowded from floor to ceiling, and stretch away from the entrance into the far People are allowed to go in and distance. read, and spend hours on the comfortable lounges\_provided by the owner for his pat-The greater number of those who avail rons. themselves of this permission go away with-out making a single purchase. This privilege involves a certain amount of risk and loss to the bookseller, but he finds that on the whole it pays him well. The great center of the German book-trade is at Leipsic, and the fair held in the latter city at Easter is the occasion on which all the accounts made in the book-trade during the past year are settled.

In publishing new books, besides the expense of copyright, paper, presswork, etc., the publisher has to consider the number of presentation copies required for reviews, the percentage off the price allowed to the retail bookseller, and the expenses of advertising.

**Boom**, a long pole or spar run out from various parts of a ship or other vessel for the purpose of extending the bottom of particular sails. Also a strong beam, or an iron chain or cable, fastened to spars extended across a river or the

### Boomerang

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mouth of a harbor, to prevent an enemy's ships from passing. A noted boom was made across the Hudson River at West Point in the Revolutionary War.

**Boo'merang**, a missile instrument used by the Australian aborigines, and by some peoples of India, made of hard wood, about the size of a common reaping-hook, and of a peculiar curved



### Forms of Boomerang.

shape, sometimes resembling a rude and very open V. The boomerang, when thrown as if to hit some object in advance, instead of going directly forward, slowly ascends in the air, whirling round and round to a considerable height, and returns to the position of the thrower. If it hits an object, of course it falls. The Australians are very dextrous with this weapon, and can make it go in almost any direction, sometimes making it rebound before striking.

Boone, DANIEL (1735-1820), a famous American pioneer. His grandfather emigrated from Bradninch, near Exeter, England. His father, Squire Boone, moved to North Carolina about 1748. Boone's education was limited to reading and writing. Skilled in woodcraft, strong and brave, he was the peer of any Indian in sagacity and fearlessness. Incited by the accounts of John Finley, with a company of six kindred spirits he penetrated into the unknown regions of Kentucky, starting on his journey May 1, 1769. He built a fort called Boones-borough on the Kentucky River, and there brought his family and about thirty volunteers. Boone was captured by the Indians and carried to Old Chillicothe on the Miami, where he was adopted by a Shawnese chief. Learning of an intended raid upon Boonesborough, he escaped (June 16), and reached home in four days, having but one meal during his journey. He found his family gone, but with others repelled the attack of the Indians. In 1780 he brought his family back to Kentucky. The battle of "Blue Licks," in which Boone's sons fought by his side, took place 1782. Kentucky was admitted into the Union Feb. 4, 1791, and in the survey of the state the title to Boone's land was disputed. He sought a new home at Point Pleasant, and in 1795 moved to Missouri, then a Spanish province. There he received a grant of 8,000 acres of land. When the Spanish possessions passed into the hands of the U.S.,

Boone again lost his land. Congress granted him 850 acres. The charm of woodcraft clung to him to the last, and in his 82d year he went on a hunting excursion. In 1845 the remains of Boone and his wife were removed to the Frankfort cemetery a few miles from the fort of Boonesborough. Enoch Boone, his son, was the first white male child b. in Kentucky.

Boots and Shoes .- The sandal is the simplest form of foot protector, and consists of a sole attached to the foot by a leather thong. Primitive races made a shoe out of a single piece of untanned hide, which was laced with a thong. Shoes laced and ornamented and extending far up the leg were in use by the ancient Egyptians, Greeks, and Romans. Boot means a leather covering for the foot and leg. Half-boots were worn by Anglo-Saxons and Normans. In the reign of Edward IV the boot proper was a part of the knightly dress. In the reign of Charles I a boot made of Spanish leather was used. The highly decorated French boot was introduced in the reign of Charles II, and the jack-boot was worn by cavalry soldiers and by horsemen gen-erally. The jack-boot was strongly made, extended above the knee with a capacious top, had a high heel, and around the ankle was a leather band bearing the spur. Boots with yellow tops were so commonly worn in the eighteenth century as to be a distinguishing feature of the Englishman's dress. Even in the earlier years of the present century top-boots were seen in the House of Commons. They still remain in use by fox-hunters and jockeys. The Hessian boot, worn over tight pantaloons, was a handsome article of gentleman's attire, and, as it contributed an elegant appearance to the nether costume, easily supplanted the top-boot. This in turn was supplanted by the Wellington boot, introduced by the great gen-eral and worn under the trousers. Even this has now given place to the short ankle boot or shoe. In the Cluny Museum, Paris, is a col-lection illustrating the innumerable forms of foot-covering of ancient, mediæval, and mod-ern times. The wooden shoe made from a single piece of wood is largely used in Europe. Clogs, or pattens, are wooden soles to which uppers of heavy leather are attached. Clogs are used by agricultural laborers on the Continent, and in England and the U.S. by dyers, bleachers, tanners, etc. Fancy clogs are used for clog-dancing.

Until lately shoemaking was pure handcraft, but now machinery performs almost every operation in the art. The difficulty of fastening together the soles and uppers by machinery was overcome in a measure by the David Reed Randolph patent, 1809, which provides for fastening the soles and heels to the insoles by little nails. The last used was covered at the bottom with plates of metal, and the nails when driven through the inner soles were turned and clinched by coming against the metal plate. This invention laid the foundation for machine-bootmaking. In 1810 M. I. Bunel patented machinery for fastening soles to uppers by means of metallic

pins or nails. The use of screws and staples was patented by Richard Woodman, 1810. Besides sewing by hand, there are three different methods for attaching soles to uppers. "Pegging" is done by driving small wooden pegs throughout sole and insole, catching between them the edges of the uppers. In "riv-eting, or clinching" iron or brass nails are used. "Screwing" has come into extensive use since the introduction of the screwing machine, which is an American invention. The screw, making its own hole, fits tightly in the leather, and the two soles, being both compressed and screwed together, make a perfectly water-tight and solid sole: In 1858 Lyman R. Blake, U. S., took the first step in the difficult problem of sewing together by machinery soles and uppers. This machine was ultimately perfected as the Mackay solesewing machine, one of the most successful and lucrative inventions of modern times. Blake secured his first patent in England in 1859. His original machine was incapable of sewing in the toe of the shoe, but Gordon Mackay and Blake together effected improvements, and in 1860 took out a patent which secured to them the monopoly for 21 years. In 1873 the income from rovalties in the U.S. alone amounted to \$589,973 and continued to rise until the patent expired in 1881. Numerous inventors have appeared, and there is not a single operation in shoe-making for which a machine has not been devised. In the modern American shoe factory, division of labor is carried to the greatest extent. Uppers and linings are generally stitched in one department, where the buttonholes are worked, buttons put on, and eyclets punched for laced shoes. The first process in bottoming is to wet the soles, which, after being partially dried, are passed under a heavy roller. They are then, if for machine-sewing, run through the channeling machine, which takes out a thread of leather from the outside edge in the bottom of the sole, leaving a thin, narrow flap all around, so that when the stitches are laid in the place of the removed leather, the bottom may be hammered down so smoothly as hardly to indicate where the surface was raised. The upper is then drawn over the last and tacked on the insole, and the outsole is tacked on. The last is now withdrawn and the shoe passed to the sewing-machine, where the stitch is made through both outsole and insole, the edge of the upper being between them. The flap is then laid and comented over the seam. The heel is put on in the rough, and the edges of both heel and sole trimmed and burnished. In making a "turn " shoe, the sole is shaped before tacking to the last: the upper, with the stiffening in, is then pulled over, wrong side out, then lasted and sewed, the last being taken out, after sewing, and the surplus upper cut away. The shoe is then turned right side out, the last again put in, and the sole and stiffening hammered into proper form. A "team" of shoemakers comprises from four to nine men,—lasters, heelers, trimmers, burnishers, and finishers. These

complete the shoe after the uppers are made and the soles cut. The number of men in a "team" varies with the kind of work. A

"team" varies with the kind of work. A very considerable trade exists in boots and shoes with outer sole of gutta-percha; the headquarters of the trade being in Glasgow. Scotland. The manufactory of india-rubber galoshes, shoes, fishing-boots, etc., forms an important branch of the india-rubber trade. Making of shoes right and left began shortly after the deginning of the nineteenth century.

Booth, BARTON (1681-1733), an English actor of celebrity in the reigns of Queen Anne and George I. He eloped from school at the age of seventeen, and joined a company of strolling players. After performing in the Irish capital with great applause, he returned in 1701 to London, where, having joined the Drury Lane Company, his reputation reached its height with the performance of Cato in Addison's famous tragedy. He was buried in Westminster Abbey.

Booth, EDWIN THOMAS (1833-1893), an American actor, son of the distinguished English actor, Junius Brutus Booth (1796-1852; spent most of his life in the U. S.). He was b. in Bel Air, Md., and made his first appearance at Boston in 1849. He is eminent for his personation of Shakespearian characters,—Othello, Richard III, Iago, Shylock, etc.,—and is regarded as the leading American tragedian. In 1882 he made a professional tour in Europe, and was favorably received.

Booth, JOHN WILKES (1838-1865), the assassin of President Lincoln, brother of Edwin Booth. As an actor he never rose to distinction. He inherited from his father a touch of insanity that rendered his life erratic. During the Civil War his sympathies were for negro slavery, and early in 1865 he formed a conspiracy with others to murder President Lincoln and the principal officers of the government. On the evening of April 15 he entered Ford's theater, in Washington, where the president was sitting in a private box, and shot him. He shouted "Sic semper tyrannie," leaped on the stage below, breaking his leg in the effort, and in the confusion escaped through a back door, mounted a horse that was held in waiting, and fled to Virginia. Here he was concealed for a time by sympathizers; but, on being discovered in a barn, he refused to surrender and was shot.

Booth, WILLIAM, general of the Salvation Army, b. at Nottingham, England, April 10, 1829. He was reared in the Episcopalian Church, but being converted in a Wesleyan chapel, he joined the Methodist Church, and in 1850 became a minister, He was appointed to hold special evangelistic services in connection with his other work until 1861, when, being requested to settle in the ordinary circuit work, he resigned and began his career as an evangelist proper. In 1855 he had married Miss Catherine Mumford, who, in this new departure, proved an able coadjutor. Until her death in 1890 she was always by the general's side, encouraging him in all his undertakings, at the same time caring for their family.

## **Boothia** Felix

General Booth organized in London (1865) "The Christian Mission," which grew into the military organization re-christened the "Salvation Army"in 1878. Under this name that useful organization has spread itself into many parts of the world. It is widely known for the zeal and self-denial of its rank and file. A distinctive feature of the Salvation Army is what has been called "the ministry of all the talents;" that is, giving every convert some part in the work. The *War Cry*, a weekly publi-cation, was established in 1880 and has a wide circulation, General Booth has published many hymns for the use of the army, and it has gone forth "singing itself around the world." In *Darkest England*, published in 1890, Gen-eral B. outlines his plans for the suppression of poverty and vice. General B.'s sons and daughters have been trained in the work and have been associated with him in the army. Ballington, his second son, after carrying on the work in America for a number of years, withdrew, and in 1896 formed a new organization called The American Volunteers, with headquarters in New York City.

**Boo' thia Felix,** a peninsula of British North America, stretching northward from the Arctic Circle, discovered by Captain Ross in 1830. In the west coast of this country Ross was able to localize the north magnetic pole.

Boo'tle, a town of England, in Lancashire, adjoining Liverpool, the docks of which great seaport extend into the borough, so that Bootle may be looked upon as a Liverpool suburb. Pop. 49,217.

BO'ra, KATHARINA VON (1499-1552), wife of Martin Luther. She took the veil early; but applied, with eight other nuns, to Luther. The nuns were released from their convent, and in 1525 Luther married her, having himself by this time laid aside the cowl. After Luther's death she kept boarders for her support. She died at Torgau.

Boracic Acid, boric acid, a compound of the element boron, with hydrogen and oxygen. Boracic acid is found as a saline incrustation in some volcanic regions, is an ingredient in many minerals, and is contained in the steam which, along with sulphurous exhalations, issues from fissures in the soil in Tuscany. The steam from the fumaroles here is now an important source of the acid, a system of con-densation and evaporation being employed. The acid forms white, shining, scaly crystals, which on heating melt into a transparent mass, when cooled resembling glass. It dissolves in water, and has a slight acid taste: it colors blue litmus purple, and the yellow color-ing matter turmeric brown. The chief use of the acid is as a source of borax, the biborate of sodium.

Bor'age, a genus of plants having rough hairy foliage and blue, panicled, drooping flowers, and characterized by mucilaginous, and emollient properties. Borage officinalis, a common plant, gives a coolness to beverages in which its leaves are steeped, and was ranked formerly as one of the cordial flowers.

### Bordeaux

Borax, bibor-

ate of sodium.

Native borax

has long been obtained under

the name of tincal, from In-

dia, the main

source being not India but a

series of lakes in Thibet. As

imported it is

in small pieces

of a dirty yellowish color, and is covered

with a fatty or soapy matter. Tincal, which

contains various impurities.

was formerly

the only source



Common Borage. a .- flower.

of borax; but besides Tuscany, other sources of boracic acid, more particularly in North and South America, and the salt mines at Stassfurt, etc., in Germany, have been rendered available. America yields large deposits, there being rich deposits of borax and boracic minerals on the Pacific slope and especially noticeable are the vast depos-its in Death Valley. Pure borax forms large transparent, six-sided prisms which dissolve readily in water, effloresce in dry air, and when heated melt in their water of crystallization, swell up, and finally fuse to a transparent glass. Borax has a variety of uses. In medicine it is employed in ulcerations and skin diseases. It has valuable antiseptic and disinfecting properties, and is now much used for the preservation of meat, fish, and milk. It is also employed in soldering metals, and in making fine glaze for porcelain, as it renders the materials more fusible. It is used in enameling, and in making beads, glass, and cement.

Bor'da, JEAN CHARLES (1733-1799), a French mathematician and physicist. He served in the army and navy, and distinguished himself by the introduction of new methods and instruments connected with navigation, ge-odesy, astronomy, etc., being in particular the inventor of the reflecting circle. He was one of the men of science who framed the new system of weights and measures adopted in France.

**Bordeaux** (bor- $d\overline{o}'$ ), one of the most important cities and ports of France, capital of the dep. of Gironde, on the Garonne, about 70 mi. from the sea. In the old town are the Cathe-dral of Saint André, St. Michael's Church, with its superb front of florid Gothic, the Hotel de Ville, and the Palais de Justice. The chief exports are wine and brandy; sugar and other colonial produce and wood are the chief imports. Ship-building is the chief industry, and there are sugar refineries. woolen and cotton mills, potteries, soap works, distilleries, etc. Bordeaux is the *Burdigala* of the Romans. By the marriage of Eleanor, daughter of the last Duke of Aquitaine, to Henry II of England, Bordeaux was transferred to the English crown. Under Charles VII in 1451, it was restored again to France. Montaigne and Montesquieu were born in the neighborhood; the latter is buried in the Church of St. Bernard. Pop. 252,415.

Bordelais Wines, the wines of Bordeaux and district, the name of vin de Bordeaux being generally given to the wines made in the eleven departments of the s.w. of France, Gironde, Landes, Lot, Tarn et Garonne, etc., though it is in the Gironde alone that the famous growths are found. The soil of Médoc (a sandy and calcareous loam) produces such famous wines as Bhâteau-Margaux, Château-Lafitte, and Château-Latour. The wines of this country are the best which France produces. Their characteristics are fine bouquet, velvety softness on the palate, and the faculty of acting beneficially on the stomach without mounting too readily to the head. Besides the red wines of the Bordelais, known under the general name of *claret*, there are also white wines, of which the finest growths are Sauterne, Preignac, Barsac, etc.

Borden, GAIL (1801-1874), American inventor. Early in life he lived in Covington, Ky., and later in Madison, Ind. In 1822 young Borden went to Mississippi, where he became schoolteacher, county surveyor, and U. S. deputy surveyor. In 1829 he visited Texas and took charge of the official surveys of that territory. When the republic of Texas was established he became the first collector of the port of Galveston; in 1837 made the first surveys of that city. About 1849 he produced "pemmi-can" and the "meat-biscuit." The latter gained him a medal at the World's Fair in London, and he was chosen an honorary member of the London Society of Arts. Unsuccessful, pecuniarily, with his biscuit, he lost his entire means. In 1853 he applied for a patent for concentrating milk by evaporation, but did not receive it until 1856. Soon afterward the New York Condensed Milk Company was formed, and its works were established at Brewster's Station, N. Y., and Elgin. Ill. This enterprise proved an immense success, and enriched the inventor. Afterward Mr. Borden established an extract-of-beef factory at Borden, Tex., and also produced condensed preparations of tea, coffee, cocoa, and various kinds of fruit.

Bor' dentown, Burlington co., N. J., on Delaware River, 28 mi. e. of Philadelphia. Railroads: Penn. Junction to N. Y. via Trenton (2) via South Amboy; routes to the seaside resorts. Industries: worsted mills, flouring mills, three iron foundries, woolen mill, shirt factory, sawmill, shipyard, and steam forge. Steamboats ply between Bordentown and Philadelphia daily. The town was first settled in 1776 by Quakers and Dutch, and became a city in 1849. Pop. est. 1897, 5,000.

Border (or Borders), The, the territory ad-

jacent to the frontier line between England and Scotland, the scene of frequent fights and forays, among neighboring clans and families from the eleventh till the end of the seventeenth century. The dividing line varied at different times, shifting according to the surging of the tide of war or diplomacy. At present the line consists partly of natural and partly of imaginary outlines from near the mouth of the Tweed to the Solway.

**Bore** (or Eagre), a sudden influx of the tide into the estuary of a river from the sea, the inflowing water rising to a considerable height and advancing like a wall against the current. The most celebrated bores in the Old World are those of the Ganges, Indus, and Brahmaputra. The last is said to rise to a height of 12 ft. In some rivers in Brazil it rises to the height of 12 to 16 ft.

**Bo'reas**, the name of the north wind as personified by the Greeks and Romans.

Borghese (bor-ga'ze), a Roman family, originally of Sienna, where it held the highest offices from the middle of the fifteenth century. Pope Paul V, who belonged to this family, and ascended the papal chair in 1605, loaded his relations with honors and riches. He bestowed, among other gifts, the principality of Sulmone on Marco Antonio Borghese, the son of his brother Giovanni Battista, from whom is descended the present Borghese family. Bor-GHESE, CAMILLO, PRINCE (1775-1832). When the French invaded Italy he entered their service, and in 1803 he married Marie Pauline, the sister of Napoleon (b. at Ajaccio 1780, d. at Florence, 1825). In 1806 he was created Duke of Guastalla, and was appointed governor general of the provinces beyond the Alps. After the abdication of Napoleon he broke up all connection with the Bonaparte family, and separated from his wife. The *Borghese Palace* at Rome was begun in 1590, and completed by Paul V. It contains one of the richest collections of art in the city. The Villes Borghese. a celebrated country-house just outside the Porta del Popolo, Rome, belonging to the Borghese family, also contains a valuable art collection, and the surrounding grounds are very beautiful

Borgla, CESARE (Che'zåre-bor'jå) (1478-1507), the natural son of Pope Alexander VI and of a Roman lady named Vanozza. He was raised to the rank of cardinal in 1402, but afterward divested himself of the office, and was made Duc de Valentinois by Louis XII. In 1490 he married a daughter of King John of Navarre, and accompanied Louis XII to Italy. He found means to get the treasures of his father into his possession, and assembled his troops in Rome; but enemies rose against him on all sides, one of whom was the new pope, Julius II.

Borgia, LUCRETIA (1480-1523), daughter of Pope Alexander VI, and sister of Cesare Borgia. In 1403 she was married to Giovanni Sforza, lord of Pesaro, but after she had lived with him four years, Alexander dissolved the marriage, and gave her to Alphonso, nephew of Alphonso II of Naples. Two years after,

this new husband was assassinated by the hired ruffians of Cesare Borgia. Her third husband was Alphonso d'Este, son of the duke of Ferrara. She was accused by contemporaries of incest, poisoning, and almost every species of enormous crime. She was a patroness of art and literature.

Boring, the process of perforating wood, iron, rocks, or other hard substances by means of instruments adapted for the purpose. For boring wood the tools used are awis, gimlets, augers, and bits of various kinds, the latter being applied by means of a crank-shaped intransverse-handle, or drilling machine. Bor-ing in metal is done by drills or boring bars, revolved by boring machines. Boring in the earth or rock for mining, geologic, or engi-neering purposes is effected by means of augers, drills, or jumpers, sometimes wrought by hand, but now usually by machinery driven by steam or frequently by compressed air. In ordinary mining practise a bore-hole is usually commenced by digging a small pit about 6 ft. deep, over which is set up a shearlegs with pulley, etc. The boring rods are from 10 to 20 ft. in length, capable of being jointed together by box and screw, and having a chisel inserted at the lower end. A lever is employed to raise the bore-rods to which a slight twisting motion is given at each stroke, when the rock at the bottom of the hole is broken by the repeated percussion of the cutting tool. Various methods are employed to clear out the triturated rock. The work is much quickened by the substitution of steam power, water power, or even horse power, for manual labor. Of the many forms of boring machines now in use may be mentioned the diamond boring machine, invented by Leschot, a Swiss engineer. In this the cutting tool is of a tubular form, and receives a uniform rotatory motion, the result being the production of a cylindrical core from the rock of the same size as the inner periphery of the tube. The boring bit is a steel thimble, about 4 in. in length, having two rows of Brazilian black diamonds firmly embedded therein, the edges projecting slightly. The diamond teeth are the only parts which come in contact with the rock, and their hardness is such that an enormous length can be bored with but little appreciable wear.

Bor'neo (the name of a state on its n.w. coast), one of the islands of the Malay Archipelago, and the third largest in the world. Area 306,800 sq. mi.; pop. 1,700,000. There are several chains of mountains ramifying through the interior, the culminating summit (13,698 ft.) being Kini-Balu, near the northern extremity. The rivers are very numerous, and several of them are navigable for a considerable distance by large vessels. There are a few small lakes. Borneo contains immense forests of teak and other trees, besides producing various dye-woods, camphor, rattans and other canes, gutta-percha and india-rubber, honey and wax, etc. Its wild animals comprise the elephant, rhinoceros, tapir, leop-

ard, buffalo, deer, monkeys (including the orang-outang), and a great variety of the birds. The mineral productions consist of gold, antimony, iron, tin, quicksilver, zinc, and coal, besides diamonds. It is only portions of the land on the coast which are well cultivated. Among cultivated products are sago, gambier, pepper, rice, tobacco, etc. Edible birds'-nests and trepang are important articles of trade. The climate is not considered unhealthy. The southwestern, southern, and eastern portions of the island are possessed by the Dutch, under whom are a number of semi-independent princes. On the n.w. coast is the Malay kingdom of Borneo, or Bruni. Its chief town is Bruni, on the river of the same name, a place of considerable trade, and the residence of the sultan. Since 1841 there has been a state under English rule (though not under the British crown) on the w. coast of the island, namely, Sarawak, founded by Sir James Brooke, while Labuan, an island off the n.w. coast, is a British colony. Recently an English commercial company, with a charter from the British government, has acquired sovereign rights over the northern portion of the island, including some adjacent islands. British North Borneo has an area of about 31.000 sq. mi. (slightly greater than Scotland), several splendid harbors, a fertile soil, and a good climate. At present the population is sparse, and a large part of the territory consists of virgin forests. The soil is believed to be well adapted for coffee, sago, tapioca, sugar, tobacco, cotton, etc. Probably there are valuable mineral deposits also, gold having been already found. The chief settlement is Sandakan, the capital, on Sandakan Bay. The government is similar to that of British colonies. The revenue is from customs and excise duties, licenses, etc. Birds'-nests, rattans, gutta-percha, timber, etc., are exported, the trade being chiefly with Singapore and Hong Kong. Pop. est. at 150,000.

**Bor' nu**, a negro kingdom of the Central Soudan, Africa, on the w. side of Lake Chad, with an area of about 79,000 sq. mi., and a pop. est. at 5,000,000. The people practise agriculture and also various arts and manufactures. They are Mohammedans. The *Mai*, or sultan, has an army of 30,000 men, many armed with firearms. Kuka, the capital (pop. 60,000), near the western shore of Lake Chad, is one of the greatest markets in Central Africa, a large trade being done in horses, the breed of which is famed throughout the Soudan. Another large town, on the shore of the lake, is Ngornu. The whole policy of the state is based on slavery.

**Borodino'**, BATTLE or (called also battle of the Moskwa), a sanguinary battle fought near a village of this name on the river Moskwa, Sept. 7, 1812, between the French under Napoleon and the Russians under Kutusoff. Each party claimed the victory. At the end of the day the Russians retreated in good order, no pursuit taking place. The French numbered about 150,000; the Russians, some less; 50,000 dead and dying covered the field. **Borrome o, CARLO, COUNT (1538-1584), a celebrated Roman Catholic saint and cardinal.** He improved the discipline of the clergy, founded schools, libraries, hospitals, and was indefatigable in doing good. His nephew, Count Federigo Borromeo (1564-1631), also cardinal and archbishop of Milan, equally distinguished for the sanctity of his life and the benevolence of his character, is celebrated as the founder of the Ambrosian Library.

**Bor'row**, GEORGE (1803-1881), English writer. He had a passion for foreign tongues, stirring scenes, and feats of bodily prowess. He associated much with the gypsies, and acquired an exact knowledge of their language, manners, and customs. As agent for the British and Foreign Bible Society he traveled France, Germany, Russia, and the East; spent five years in Spain, and published *The Gypsies in Spain* (1841), and *The Bible in Spain* (1842), the best known of his works.

**Bosch-bok** (bosh'bok), the bush-buck, a name given to several South African species of antelope.

**Bosch-vark** (bosh'värk), the bush hog or bush pig of South Africa, one of the swine family, about five feet long, and with very large and strong tusks. The Kaffirs esteem its flesh as a luxury, and its tusks, arranged on a piece of string and tied around the neck, are considered great ornaments.

**Bos' cobel**, locality in Shropshire, England, remarkable historically as the hiding place of Charles II for some days after the battle of Worcester, Sept. 3, 1651. At one time he was compelled to conceal himself among the branches of an oak in Boscobel Wood, where it is related that he could actually see the men who were in pursuit of him, and hear their voices. The "royal oak," which now stands at Boscobel, is said to have grown from an acorn of this very tree.

**Bosna-Serai** (or Serajevo) (se-ri', se-r-á yā'võ), the capital of Bosnia, 570 mi. w.n.w. of Constantinople. It contains a serai, or palace, built by Mohammed II, to which the city owes its name. It was formerly surrounded with walls, but its only defense now is a citadel, built on a rocky height at a short distance east from the town. Bosna-Serai is the chief mart in the province, the center of the commercial relations between Turkey, Dalmatia, Croatia, and South Germauy, and has, in consequence, a considerable trade, with various manufactures. Pop. est. at 46,000.

**Bos' nia**, a Turkish province in the northwest of the Balkan Peninsula, w. of Servia, by the Treaty of Berlin (1878) to be administered for an undefined future period by the Austrian government; area (including Herzegovina and Novi-bazar), 20,177 sq. mi. (of which Bosnia proper occupies 16,000), with 1,454,365 inhabitants, mostly of Slavonian origin, and speaking the Serbian language. They are partly Mohammedans, partly Roman and Greek Catholics. The country is level toward the north, in the south mountainous. Its chief rivers are the Save, the Verbas, the Bosna, Rama, and Drina. About half the area is covered with forests. Tillage is carried on in the valleys and low grounds; maize, wheat, barley, rye, buckwheat, hemp, tobacco, etc., being grown. Fruits are produced in abundance. Sheep, goats, and swine are numerous. The minerals include coal, which is worked in several places, manganese, antimony, iron, etc. Among the manufactures are iron goods, arms, leather, linens, and woolens. Bosnia had been subject to Turkey from the beginning of the fifteenth century till 1875, when an insurrection of the inhabitants led indirectly to the Russo-Turkish war of 1877-78 and the subsequent dismemberment of the Turkish Empire.

**Bos porus** (or Bosphorus), the strait, 19 mi. long, joining the Black Sea with the Sea of Marmora, called also the Strait of Constantinople. It is defended by a series of strong forts; and by agreement of the European powers no ship of war belonging to any nation shall pass the Bosporus without the permission of Turkey. Over this channel (about 3,000 ft. wide) Darius constructed a bridge of boats on his Scythian expedition. (See Constantinople.) The Cimmerian Bosporus was the name given by the ancients to the strait that leads from the Black Sea into the Sea of Azov. There was also anciently a kingdom of the name of Bosporus, so called from this strait, on both sides of which it was situated.

**Boss**, in architecture an ornament placed at the intersection of the ribs or groins in vaulted or flat roofs; it is frequently richly sculptured with armorial bearings or other devices.

**Bossuet** (bos-u-ā), JACQUES BENIGNE (1627-1704), illustrious French preacher and theologian. At the age of fifteen he entered the College of Navarre, where he studied Greek and the Holy Scriptures, read the ancient classics, and investigated the Cartesian philosophy. In 1652 he was ordained priest, and made a canon of Metz. In 1670 he was appointed preceptor to the Dauphin, and in 1681 he was raised to the see of Meaux. In his latter years he opposed Quietism, and prosecuted Madame Guyon. He was unrivalled as a pulpit orator.

a pulpit orator. **Bos'ton**, a town of England, in Lincolnshire, on the Witham, about 5 mi. from the sea. The name stands for Botolph's town, St. Botolph having founded a monastery here about the year 650. The trade is increasing through the improvement of the accommodation for shipping. The town contains some fine buildings, the parish church being a very large and handsome Gothic structure, with a tower nearly 300 ft. high. Ropes, sails, agricultural implements, etc., are made. Pop. 14,593.

**Boston**, the largest city in New England, and capital of Massachusetts, lies 234 mi. n. e. from New York, on Massachusetts Bay. It has a harbor, covering 75 sq. mi. protected by a great number of islands. The scenery is varied and picturesque. The streets are mostly narrow and irregular in the older parts of the town, but in the newer parts are many fine,

#### Boswell

spacious streets. There are many small parks, and a series of connecting parks is in process of formation; at present the Common and the Public Garden in the heart of the city are the chief pleasure grounds. Among the principal buildings are the statehouse; the county courthouse; the post-office; Feneuil Hall (from Peter Faneuil, who presented it to the city in 1742), famous historically as the meeting-place of the Revolutionary patriots; the city hall, or old statehouse, now used as public offices; the splendid granite customhouse, of Grecian architecture; public halls, theaters, etc. Harvard University, situated at Cambridge, which may be regarded as a Boston suburb, was founded in 1638. The library has 260,000 vol-The medical branch of this instituumes. tion is in Boston. The Boston Athenæum has two large buildings-one containing a library, and the other a picture gallery, a hall for public lectures, and other rooms for scientific purposes. The library consists of about 100,-Boston University, founded 000 volumes. principally by Isaac Rich, and incorporated in 1869, consists of the college of liberal arts; college of music; college of agriculture; school of theology; school of laws; school of medicine; and the school of all sciences. It is as open to women as to men; average number of students 600. A prominent feature in Boston is the number of good libraries. Besides those already mentioned, there is the Public Library, founded in 1852, which already contains 400, 000 volumes; the State Library, with 50,000 volumes; and others. The new public library building has just been completed. Boston carries on an extensive home and foreign trade, and is also largely engaged in the fisher-ies. Many manufactures are carried on, one ies. of the principal being that of boots and shoes. The first American newspaper was set up here The book trade of the city is imporin 1704. tant, and some of the periodicals are extensively circulated. Boston was founded in 1630 by English emigrants, and received its name from Boston in Lincolnshire, whence several of the settlers had come. Notwithstanding its increasing size and importance, the affairs of Boston for nearly two hundred years were administered by the townspeople, assembled in "town's meeting." In the War of Independence it played an important part. It was here that the opposition to the British measures of colonial taxation were strongest. The defiance reached its height when the Stamp Act was repealed, and the Tea Act denounced by three cargoes being thrown into the harbor. Here the Battle of Bunker Hill was fought, June 17, 1775. Pop. 450,000.

Bos' well, JAMES (1740-1795), the friend and biographer of Dr. Johnson, was the eldest son of Lord Auchinleck, one of the supreme judges of Scotland. He was educated at Edinburgh and Cambridge, became a member of the Scottish bar. In 1763 he became acquainted with Johnson. He afterward visited Voltaire at Ferney, Rousseau at Neuchâtel, and Paoli in Corsica. In 1785 he settled at London, and was called to the English bar. In 1773 he accompanied Johnson on a tour to the Scottish highlands and the Hebrides, and he published an account of the excursion after their return. His Life of Samuel Johnson, one of the best pieces of biography in the language, was published in 1701. His son Alexander, b. in 1775, created a baronet in 1821, killed in a duel in 1822, excelled as a writer of Scotch humorous songs, and was also a literary antiquary of no inconsiderable erudition.

**Bos' worth, a** small town in the county of Leicester, England, about 3 mi. from which is Bosworth Field, where was fought, in 1485, the battle between Richard III and the Earl of Richmond, afterward Henry VII. This battle, in which Richard lost his life, put a period to the Wars of the Roses. Pop. 1,149.

Botan' ic Gardens, establishments in which plants from all climates are cultivated for the purpose of illustrating the science of botany, and also for introducing and diffusing useful or beautiful plants from all parts of the world. Until modern times their sole design was the cultivation of medicinal plants. In Britain the chief gardens are those of Kew, Edinburgh, and Dublin. On the European continent the chief are the Jardin des Plantes at Paris, founded 1634; and those of Berlin, Copenhagen, Florence, etc. In America the chief are those of New York, Philadelphia, and Cambridge.

Botany, from the Greek word Botane, meaning herb or plant. There are in nature three great kingdoms, the mineral, animal, and vegetable. Botany is the science or study of the vegetable kingdom. Animals and plants have in common that strange thing which we call The difference between plants and anilife. mals consists chiefly in three things-1, in power of motion; 2, in will power; 3, in their food. Plants feed upon earth, air, and water. Animals feed upon plants or upon other animals. The great use of plants is as food for animals. To make its own life as complete as possible and to prepare seed which shall produce other plants like itself are the two objects of every plant. To attain these objects plants seek the sunshine and send their roots deep into the earth in search of moisture and fasten themselves firmly in order to resist the force of the wind.

There is in every seed a small point called the embryo, which under the microscope is seen to be the future plant, carefully folded and packed among starch granules which are to be its first food and supply its needs until it is strong enough to gather its food from the earth around it. When a seed is put into the ground the plant is not newly formed but only developed by the moisture and warmth and nourished by the surrounding starch. Before the embryo is formed in the seed there is in every seed a small point which is known as the nucleus. Under a strong microscope this is found at first to be a tiny cell or sac containing a granular liquid substance known as protoplasm. Protoplasm consists of albumen, granules of faity matter and water. It is called "the physical basis of life." Growth is the increase of a living thing in size and substance. Growth begins in the germ in one tiny cell usually not more than one four hundredth of an inch in diameter. This cell enlarges and divides by putting a little partition across between its two walls; these in turn put in partitions in both directions; each divides again and again, forming a cluster or mass of cells essentially like the first and all proceeding from the first. Soon the embryo begins to shape itself. A tiny root end is formed and the other end is notched into two lobes and shaped into the seed-leaves of the future plant. Later when the seed is placed in the earth and the plant springs from the ground its growth continues in the same manner. Vegetable growth consists of two things-1, the expansion of each cell till it reaches its full size; 2, the multiplication of cells in number by division. These cells become countless millions in number. This is organic structure, and because it is composed of cells the substance of plants is called cellular tissue. The cells of ordinary plants vary in size from  $\frac{1}{30}$  to  $\frac{1}{1000}$  of an inch in diameter. The usual size is from  $\frac{1}{360}$  to  $\frac{1}{560}$  of an inch so that there are from 27,000,000 to 125,000,000 in each cubic inch of substance.

The vegetable kingdom has been classified in several different ways. The two chief being the natural and the artificial system. Linnæus, a Swedish naturalist, made an artificial classification of the vegetable kingdom about 1750. He classified plants with reference only to the number of their stamens and pistils. The natural system classifies all plants with reference to the whole structure according to their points of similarity. The natural system divides the vegetable kingdom into four great growths of plants although many naturalists make only three divisions, grouping the ferns and mosses into one large group.

The first great group known as the Thallophytes, includes the plants lowest in organization. They have no wood properly so called, and the stems and leaves are undistinguishable. They are mere masses of cells. This class includes the Algæ, and the Fungi. These are the seaweeds, the diatons, nostoc, bacteria, pond scums, molds, rust, mushrooms, toadstools, yeast, and ferments.

The second group, known as the Archegoniates, includes the branching but not flowering plants. This division includes all the mosses and fern-like plants and cone-bearing trees and shrubs. It is this division that is sometimes divided in two, forming the group of mosses, and the fern group.

The third group, the Angiosperms, includes the true flowering plants. This division includes the palms, water plantain, orchids, sedges, and grasses, also the poplar, willow, oak, beech, etc., and the rose, the pea, and other flowering plants. The difference which distinguishes the last group from the others is that here we find the formation of seed.

Seaweeds were probably the first forms of life upon the earth, because they are able to assimilate purely organic food substances,

while the fungi seem to have appeared later and are dependent upon other plants to provide them with carbon. Slime-fungi clearly resemble the rhizopods of the animal kingdom. On this border line between animals and plants the distinction is made chiefly in regard to their methods of taking food, and upon these simplest forms of life only an artificial boundary can be drawn. Mold begins life only as a single cell consisting of colorless protoplasm covered with a cell-wall. Yeast increases so rapidly that the daughter cells commence to form buds before they are sepa-rated from the mother cell. The simplest rated from the mother cell. form of green plant known may be found in a drop of rain water which has stood for some little time. It will become green because there are small, round green bodies floating in Each of these is a distinct plant known as it. This substance may also be protococcus. seen on trees, and fences. When bacteria or microbes were first discovered by Ehrenburg he classed them with the infusoria of the animal kingdom, and afterward for a long time their true nature was a matter of doubt. They are now generally regarded as belonging to the simplest form of vegetable life. The cells of bacteria are constructed like other plant cells. As far as animal life is concerned some of the species are harmless, or even perhaps beneficial, while others are the source of the most contagious diseases. Microbes are found everywhere in the air, in surface water, and in the upper layers of the soil. Leprosy, smallpox, scarlet fever, measles, yellow fever, and many other diseases owe their origin to bacteria. Ferns, usually considered flower-less, have spores instead of seed. Spores are single cells which are dehisced from the plant for purposes of reproduction. The third great class of plants is the flowering and seed producing plants with which we are familiar.

*Roots.*—The first root is that sent down from the embryo. This may be seen in the morning glory, buckeye, maple, beech, and many other plants. In some trees as the oak, it is the main root for many years. In many plants several roots start so near together from the base of the seedling stem that they form a bundle or cluster of roots instead of one main root. This is the case with Indian corn, the pumpkin, and pea. Besides fastening the plant to the soil, the use of roots is to absorb moisture from the earth. Frequent branching increases the surface of the root and its power of absorption. Many roots are storehouses of food for the future plant, as the carrot, beet, and parsnip root. Plants that live two or three years or more usually have such roots. The finest examples of air-roots occur in warm and damp climates, as the mangrove, the sugar cane, and the banvan tree of India. Some of our common plants send out small air-roots by which they fasten themselves to the wall. The trumpet creeper and the ivy are examples. Air plants fasten themselves by their roots to the bark of trees and live wholly upon what is fur-nished by the air. To this class belong the orchids and the black moss of the South. Para-

site plants use their roots not only to fasten themselves upon other plants for support, but also to penetrate their substance and feed upon their juices. The mistletoe is such a shrub. The root penetrates the bark of the tree upon which the seed has fallen and fastens itself as firmly as if it were a natural branch. The dodder, a parasitic plant, grows a few inches from the ground and winds itself around some plant upon which to live. It attaches itself by a small root, and having no further use for its own ground roots or supporting stem, they are allowed to die and the dodder lives upon its victim. It needs only flower for seed and roots to gather its support from its afflicted neighbor.

Stems, Branches, and Leaves.—When the stems and branches rise above the ground the plant is said to have a true stem, but when there are only leaves or leaf-stalks or flower-stalks the plant is said to be stemless. The common violet is an example. Suckers are branches that grow from the stem under ground, as the rose, raspberry, and many trees. Stolons are trailing branches that take root when they strike the ground, as the currant and the gooseberry. Runners are long and slender. leafless, creeping branches, of which the strawberry is an example. Tendrils are branches of a very slender kind intended for climbing. The grapevine, Virginia-creeper, and cucumber are examples. Thorns (or spines) are stunted and hardened branches. Thorns sometimes branch as in the honey locust. Prickles, as those of the rose, are wholly different from thorns. Thorns are connected with the stem and are changed branches, while prickles are only attached to the bark. The particular use of leaves is to furnish the plant with a large surface exposed to the light and air. The Washington elm at Cambridge, Mass., is not a remarkably large tree, but it has been estimated that it produced 7,000,000 leaves, having a surface of 200,000 sq. ft. or about five acres of foliage. Leaves consist of a woody framework, the green pulp, and the leaf-skin which covers the whole. The green of leaves (chlorophyll) is a compound made up of substances which vary in color from blue to yellow and orange. As these substances do not occur in the same proportions we have a great variety in the tints of leaves. These substances are also affected by the action of light and the supply of nourishment. Leaves are supplied with breathing mouths which open into the air passages of leaves. They are chiefly on the under side of the leaf. Leaves are said to be simple when the blade is all of one piece; compound when the leaf consists of two or more separate pieces borne upon one leaf-stalk.

Fourers.—The leaves of the flower are usually in two circles. The outer circle is called the calyx and the leaves are usually green. The inner circle, which is usually highly colored, is the corolla. Each separate part of the corolla is called a petal, and each separate part of the calyx is called a sepal. The corolla and calyx serve to protect and nourish the parts within, but do not themselves make a

perfect flower. The essential organs are the stamens or fertilizing organs of the flower and the pistils which are to be fertilized and produce the fruit and seed. Some flowers by high cultivation are made to consist only of flower leaves, that is, of calyx and corolla, and have lost their essential organs and do not produce seed. The hydrangea and snowball are examples. A stamen consists of a delicate stalk or filament and the anther. The anther is a case commonly of two lobes which contain a dust-like substance called pollen. The anther discharges this pollen when it becomes ripe, and the whole office of the stamen is to produce this pollen. A grain of pollen is made up of two coats. The outer coat is thick but weak and decorated with lines or bands or studded with points, while the inner coat is extremely delicate and its cavity is filled with a thick fluid often made turbid by an immense number of minute grains that float in it. A pistil consists of three parts-1, the top, called the stigma, which receives the pollen grains from the stamen; 2, the stalk, that supports the stigma, called the style; 3, the hollow case at its base, called the ovary, which contains the young seeds or ovules. In the colors and shapes of flowers beauty and use are combined. Insects are attracted by brilliant colors, while moths are attracted in the evening and at night by white flowers. The veins of flowers serve as honey guiders. They al-ways converge to the nectaries. Night-opening flowers are found not to possess veins as they would not be visible in the darkness. Intensity of color is due to the necessity of attracting insects which carry the pollen, and frequently the inside of the flower is more highly colored than the outside in order to tempt an insect to enter. Nodding flowers bend in order to prevent their honey from being dissolved away by the rain or the dew. Flowers with a large lower lip are so formed that insects may alight upon the lip and creep into the flower leisurely. Wind-fertilized flowers are usually borne upon shrubs and trees where their elevation above the ground allows the wind to carry the pollen more freely. The odor, like the bright color, is also to attract insects. The perfume of flowers proceeds from the honey or nectar. If honey and perfume were not associated insects would soon discern the cheat and cease to be attracted by the perfume. The honey of flowers is secreted by special glands called nectaries. The position of these glands varies in different orders of flowers. In the crown imperial lily there are deep pits for the honey at the base of the corolla. The hellibore uses its small, folded petals as nectarines. In the orchids and larkspur the honey is borne in the spur of the flower while in some orchids the sweetness seems to be in the tissues of the spur which must be gnawed in order to secure it. Flowers which are not conspicuous for form or color are generally most attractive for perfume. There is a large class of flowers whose odor is disagreeable and it is found that these attract flies and not bees or butterflies. Raf-

flesia, the largest flower known, has a strong odor of decaying flesh and is usually surrounded by a swarm of flies. Only the seedvessel and the seed which it contains are called fruit. Mulberries, figs, and pineapples are masses of fruit with a pulpy flower-stalk. The strawberry is the enlarged and pulpy receptacle. There are three kinds of fruit: flesh fruit, stone fruit, and dry fruit. All berries belong to the first class. To the stone fruit belong the cherry, plum, and peach. In the raspberry and blackberry each grain is one of the dry fruits. A grain is a fruit in which the covering of the fruit and the fruit itself are so closely unlted that they cannot be separated. Wheat, Indian corn, and other grains belong to this class. A nut is a dry fruit with a hard, bony covering, as the cocoanut, hazelnut, chestnut, and acorn. Seeds have usually two coats and the various markings of seed depend upon the outer coat. In the trumpet creeper the outer coat is expanded as a wing so that the wind may carry it easily. The soft hairs of the milkweed and the silkweed are for the same purpose. All trees and most shrubs have a strong, tough texture which is called wood. Wood consists of threads of fiber, separated by ducts. In fine wood the small tubes are about  $\frac{1}{3}$ , of an inch in diame-ter, but in the tough bark of basswood they are only  $\frac{1}{3}$ , of an inch. Milk vessels, tur-pentine vessels, and oil vessels are canals formed among the cells and filled with the peculiar product of these plants. Plants Doing Work.—Plants change inorganic

Plants Doing Work.—Plants change inorganic matter into organic matter. Carbonic acid gas is one of the component parts of the atmosphere, but it is only  $\frac{1}{1300}$  of the air and in this proportion it is not enough to injure animal life, to which it is a poison, but it is enough for plants of which it is the food. The atmosphere around us consists of oxygen and nitrogen. Nitrogen does not support animal life, it only dilutes the oxygen gas, making it the proper strength for animals to breathe. Plants take in carbon chiefly through the breathing mouths with which the lower surface of the leaves is covered. Decayed vegetable matter in the soil also furnishes carbon to living plants.

Many plants store up quantities of starch for future use. Some plants as the turnip, carrot, and dahlia accumulate starch in the root. The ice-plant and century-plant store it up in the fleshy leaves, and the cactus in the whole thickened body. In Indian corn and horse chestnut it is placed in the seed. Sugar is a product of plants. Morphine, strychnine, and quinine are principally found in the cells or spaces in the bark. They seem to have no part in the growth of the plant but are the completest results of vegetation. Almost 2,000 years ago Pliny observed certain motions in plants at evening and at morning, which indicated that during the night they had a period of rest or sleep. The position of the leaves is changed in such a way as to protect the upper surface of the leaf. The common wood-sorrel, the white clover, and cultivated nasturtium are among the best examples. Some plants feed upon insects. The little sum-up and with these plants. The leaves are covered with small bristle-like glands which secrete a sweet. sticky fluid. This attracts small insects and as soon as the slightest touch is felt upon the leaf these hairs bend toward the center and close in upon the object. As soon as an insect is caught the secretion from the glands is rapidly increased, and as insects breathe by means of pores these pores are so filled by this secretion that the insect dies from suffocation. After the insect is caught a change is made in the secretion and it becomes acid and digests the little animal. The pitcher plant and the Venus fly-trap are other flesh-eating plants. The largest known flower is one discovered in the East Indies by Sir S. Raffles and named after him Rafflesia; it is a large, fleshy parasite drawing upon the roots of other plants. It has five petals measuring in length about 12 in. from the base to the point. The bowl in the center of the plant would hold about twelve pints and the weight of the flower is about fifteen pounds. The bamboo is a species of grass which grows so large and so hard that it is used for building and for all sorts of furniture, for water pipes and for supporting The smaller stalks are used for walkbeams.

ing sticks, flutes, etc. Botany Bay, a bay in New South Wales, so called by Cuptain Cook on account of the great number of new plants collected in its vicinity. The English penal settlement, founded in 1788, and once popularly known as Botany Bay, was formerly located at Port Jackson, some miles to the northward, near where Sydney now stands.

Botau'rus, the bittern genus of birds.

Botetourt, NORBORNE BERKELEY (1738-1770), an English colonial governor. In 1761 he was colonel of militia, and became a peer in 1764. In July, 1769, he became governor of Virginia. In May, 1769, the Virginia assembly complained of parliamentary taxation, and of sending accused persons to England for trial; in reply Lord Botetourt dissolved the legislature. The trouble between the governor and the people gradually subsided, but they would not assent to parliamentary taxation. Lord Botetourt asked to be relieved, and died a short time afterward.

**Botfly**, Gadfly, and Warble-fly, names common to many insects of the family Estridæ, the genus Estrus of Linnæus. The name bot is sometimes restricted to the parasitic and



Ox Botfly.

a.-larva, full grown, natural size; b.-pupa; c.-perfect insect (magnified.)

# Bothnia

destructive larvæ, which appears to have been its original use, the other names being given to the perfect adults, and the name gadily often to blood-sucking insects of the very different genus Tabanus (q. v.), to which some try to restrict it. The insects of this family are now supposed not to be those which were called (Estrus by the ancients, although, like them, extremely troublesome to cattle. They are Dipterous (two-winged) (q.v.) insects, nearly allied to the Muscides (house-fly, flesh-fly, blow-fly, etc.).

The head is large, and as if blown out; the antennæ are short and spring from deep pils: the proboscis and palps are degenerate; the eyes are small, and there are three eye-spots; the posterior part of the body is rounded; the hindmost legs are often very long. The larvæ have toothed body-rings, and are parasitic in the nose, throat, stomach, or under the skin of mammals, and are unfortunately more familiar than the bee-like adults.

Both 'nia, Gulf of, the northern part of the Baltic Sea, which separates Sweden from Finland. Length about 450 mi., breadth 90 to 130 mi., depth from 20 to 50 fathoms. Its water is but slightly salt, and it freezes in the winter, so as to be passed by sledges and carriages.

**Both' well,** a village of Lanarkshire, Scotland, on the Clyde, 8 mi. e. of Glasgow. Here is Bothwell Bridge, where a decisive battle was fought in 1679, between the Scottish Covenanters and the royal forces commanded by the Duke of Monmouth, in which the former were totally routed. Near by are the fine ruins of Bothwell Castle, once a stronghold of the Douglases.

Both' well, JAMES HEPBURN, EARL of (1520-1576), known in Scottish history by his marriage to Queen Mary. It is believed that he was deeply concerned in the murder of Darnley, Mary's husband, and that he was even supported by the queen. He was charged with the crime and tried, but, appearing along with 4,000 followers, was readily acquitted. He was now in high favor with the queen, and with or without her consent he seized her at Edinburgh, and carrying her a prisoner to Dunbar Castle prevailed upon her to marry him after he had divorced his own wife. A confederacy was formed against him, and in a short time Mary was a prisoner in Edinburgh, and Bothwell had been forced to flee to Denmark, where he died.

**Bo-tree**, the pipal, or sacred fig-tree of India and Ceylon venerated by the Buddhists and planted near their temples. One specimen at Anurajahpoora in Ceylon is said to have been planted before 200 B. c. It was greatly shattered by a storm in 1887.

Botrychium (bo-trik'i-um), a genus of ferns, one species of which, the common moonwort, is a native of Britain, growing on elevated heaths and pastures where other ferns are seldom found. The largest species is a native of North America, New Zealand, the Himalayas, etc.

Botta, PAUL EMILE (1800-1870), French trav-

eler and archæologist. He discovered the ruins of ancient Nineveh in 1843 while acting as consular agent for the French government at Mosul. As the result of his investigations he published two important works—one on the cuneiform writing of the Assyrians and the other upon the monuments of Nineveh—the latter of which is a work of great splendor and marks an era in Assyriology.

**Böttger** (or Böttiger) (bout'ger or beu'tiger), JOHANN FRIEDRICH (1682-1719), German alchemist; the inventor of the celebrated Meissen porcelain. His search for the philosopher's stone or secret of making gold led him into many difficulties. At last he found refuge at the court of Saxony, where the elector erected a laboratory for him, and forced him to turn his attention to the manufacture of porcelain. resulting in the invention associated with his name.

Botticelli (bot-tē-chel'lē), SANDRO (for Allessandro) (1447-1515), an Italian painter of the Florentine school. Working at first in the shop of the goldsmith Botticelli, from whom he takes his name, he showed such talent that he was removed to the studio of the distinguished painter, Fra Lippo Lippi. From this master he took the fire and passion of his style, and added a fine fantasy and delicacy of his own. He painted flowers, especially roses, with incomparable skill. In his later years Botticelli became an ardent disciple of Savonarola, and is said by Vasari to have neglected his painting for the study of mystical theology.

Bottle, a vessel of moderate or small size, and with a neck, for holding liquor. By the ancients they were made of skins or leather; they are now chiefly made of glass or earthenware. The common black bottles of the cheapest kind are formed of the most ordinary materials, sand with lime, and sometimes clay and alkaline ashes of any kind, such as kelp, barilla, or even wood ashes. This glass is strong, hard, and less subject to corrosion by acids than flint-glass. In bottle making the glass is blown instead of pressed into form. In smelting, the glass is gathered upon pipes or tubes. When taken from the furnace the ball is rolled upon a slab of iron, the operator blowing through the pipe meanwhile. This forms a long, hollow, pear-shaped mass which is then swung into an open mold, the mold closed upon it, and the glass forced into every detail of the pattern by the lungs of the blower. The extra glass above the mold is broken off, the bottle removed, and the mouth shaped up by softening in the oven and working with a special tool. It is then sent through the tempering oven. The molds are kept very cool by a blast of air from a large air tube overhead. It is important that the proper amount of glass be gathered for a bottle, otherwise the bottles are too thick or too thin. The lettering on bottles is done by a plate engraved reverse and placed in the mold. Bottle making is not considered high-class work and is largely done by cheap labor.

Bouches-du-Rhône (bösh-dü-ron), "Mouths

of the Rhone," a dep. in the s. of France, in ancient Provence. Chief town, Marseilles. Area, 1,971 sq. mi., of which about one half is under cultivation. The Rhone is the principal river. The climate is generally very warm; but the dep. is liable to the *mistral*, a cold and violent n. e. wind from the Cevennes ranges. Much of the soil in unfruitful, but the fine climate makes the cultivation of figs, olives, nuts, almonds, etc., very successful. The manufactures are principally soap, brandy, olive oil, chemicals, vinegar, scent, leather, glass, etc. The fisheries are numerous and productive. Pop. 630.622.

**Boucleault** (b5'si-kō), Diox (1822-1890), dramatic author and actor. He was intended for an architect, but the success of a comedy, the well-known *London Assurance*, which he wrote when only nineteen years old, determined him for a career in connection with the stage. In 1853 he went to America, where he was scarcely less popular than in England. On his return in 1860 he produced a new style of drama, of which the *Colleen Bauen* and Arrah-na-Pogue are the best examples. As an actor he was clever, but not highly gifted. His dramatic pieces are snid to number upward of 150.

**Boufflers** (or Bouffers) (bö-flår), LOUIS FRANcors, DUC DE (1644-1711), Marshal of France, one of the most celebrated generals of his age. He learned the art of war under such renowned generals as Condé, Turenne, and Catinat. His defense of Namur against King William of England, and of Lille against Prince Eugene, are famous, and he conducted the retreat of the French at Malplaquet with such admirable skill as quite to cover the appearance of defeat.

**Boudinot,** ELIAS (1740–1821), American patriot and philanthropist. During the troubles of the Revolution he united with the patriots, and in 1777 became commissary general of prisoners. He was chosen a delegate to Congress from New Jersey in 1777, and served in 1778 and 1770, and again from 1781 until 1784. On Nov. 4, 1782, he became president of Congress, and as such signed the treaty of peace with Great Britain. Later he resumed the practise of law, and served in Congress from 1789–1795. He was director of the mint in Philadelphia 1795–1805. He was a trustee of Princeton and in 1505 endowed it with a cabinet of natural history. He was the first president of the American Bible Society.

**Bougainville** (bö-gan-vēl), Louis ANTOINE DE, (1729-1811), a famous French navigator. At first a lawyer he afterward entered the army and fought bravely in Canada under the Marquis of Montcalm, and it was principally owing to his exertions, in 1758, that a body of 5,000 French withstood successfully a British army of 16,000 men. After the battle of Sept. 13, 1759, in which Montcalm was killed and the fate of the colony decided, Bougainville returned to France and served with distinction in the campaign of 1761 in Germany. After the peace he entered the navy, and became a distinguished naval officer. In 1763 he undertook the command of a colonizing expedition to the Fakland Islands, but as the Spaniards had a prior claim the project was abandoned. Bougainville then made a voyage round the world, which enriched geography with a number of new discoveries. In the American Revolutionary War he distinguished himself at sea, but withdrew from the service after the French Revolution and died in retirement.

**Bougainville Island,** an island in the Pacific Ocean belonging to the Solomon group (area 4,000 sq. mi.), and under German protection. It is separated from Choiseul Island by *Bouyainville Strait.* 

Bouguer (bö-gā), PIERRE (1698-1758), a French mathematician and astronomer. He was associated with Godin and La Condamine in an expedition to the South American equatorial regions to measure the length of a degree of the meridian. The main burden of the task fell upon Bouguer, who performed it with great ability, and published the results. He also invented the heliometer, and his researches about light laid the foundation of photometry.

**Bouillon** (bö-yōu), originally a German duchy, now a district in Belgium, 9 mi. wide and 18 long, on the borders of Luxemburg and Liége, a wooly and mountainous tract, with some 21,000 inhabitants. The small town of Bouillon was once the capital of the duchy, which belonged to the famous crusader Godfrey of Bouillon.

**Bouillon,** GODFREY DE, Duke of Lower Lorraine (1061-1100), "a worthy representative of Charlemagne, from whom he was descended in the female line." Bouillon gained distinction in the armies of the Emperor Heinrich IV, and was the great leader of the first Crusade. He took the title of Defender and Baron of the Holy Sepulcher. At Ascalon, with 20,000 men, he defeated the sultan of Egypt with 400,000. He then devoted himself to organize his government, and drew up, for his courts of justice, the Assizes of Jerusalem, a code of laws which was the fullest embodiment of feudal jurisprudence. He was buried on Mount Calvary. His many virtues are justly extolled in Tasso's Jerusalem Delivered.

**Boulak'**, a town of Lower Egypt, a suburb and port of Cairo. It has cotton, sugar, and paper factories, and till recently had a famous museum of antiouities. Pop. 10.000.

museum of antiquities. Pop. 10,000. Boulanger, GEORGE ERNEST JEAN MARIE (1837-1891), a French soldier. He served in Algeria, Italy, and Cochin China, fought under the republic during the Franco-Prussian War, and became brigadier general in 1880. He was minister of war 1886-87. In this capacity he was active in procuring the expulsion of the Orleans princes from the army and from France. He successfully contested several seats in the Chamber of Deputies, and 1889. was elected deputy for Paris by a very large vote. Two months later the government, claiming to have evidence of his intended treason, began a prosecution, and Boulanger fied to Brussels, and thence to the Isle of Jersey. He was convicted in his absence and remained an exile. He committed suicide in Brussels

on the grave of a lady to whom he had been deeply attached.

**Boulder** (böl'dèr), a rounded water-worn stone of some size; in geol. applied to ice-worn and partially smoothed blocks of large size lying on the surface of the soil, or embedded in clays and gravels, generally differing in composition from the rocks in their vicinity, a fact which proves that they must have been transported from a distance, probably by ice. When lying on the surface they are known as *erratic blocks*. The *boulder-clay* in which these blocks are found belongs to the post-tertiary or quaternary period. It occurs in many localities, consists of a compact clay often with thin beds of gravel and sand interspersed, and is believed to have been deposited from icebergs and glaciers in the last glacial period.

**Boulder,** Boulder co., Colo., on Boulder Creek, 29 mi. n.w. of Denver. Railroads: Union Pacific, and Union Pacific, Denver, & Gulf. Industries: flouring mills, iron foundry, two cigar factories and other small industries. Surrounding country agricultural and mineral. Boulder is the seat of the University of Colorado. It was first settled in 1853 and became a city in 1873. Pop. est. 1897, 6,000.

Boulogne (bö-lon-ye or bö-lon) (or Boulognesur-Mer), a fortified seaport of France, dep. Pas de Calais, at the mouth of the Lianne. In the castle, which dates from 1231, Louis Napoleon was imprisoned in 1840. Boulogne has manufactures of soap, earthenware, linen and woolen cloths; wines, coal, corn, butter, fish, linen. and woolen stuffs, etc., are the articles of Steamboats run daily between this export. place and England, crossing over in two or three hours. Napoleon Bonaparte, after deepening and fortifying the harbor, encamped 180,000 men here with the intention of invading Britain at a favorable moment; but upon the breaking out of hostilities with Austria, 1805, they were called to other places. Pop. 42,205.

Boulogne-sur-Seine, a town of France, dep. Seine, s.w. of Paris, of which it is a suburb. It is from this place that the celebrated Bois de Boulogne gets its name. Pop. 30,084. Boulton (bol'ton), MATTHEW (1728-1809), a

**Boulton** (böl'ton), MATTHEW (1728-1809), a noted English mechanician. He engaged in business as a manufacturer of hardware, and invented and brought to great perfection inlaid steel buckles, buttons, watch-chains, etc. The introduction of the steam engine at Soho led to a connection between Boulton and James Watt, who became partners in trade in 1769.

**Bounty**, in political economy, is a reward or premium granted for the encouragement of a particular species of trade or production, the idea being that the development of such trade or production will be of national benefit. The same name is given to a premium offered by government to induce men to enlist in the public service, especially to the sum of money given in some states to recruits in the army and navy. During the Civil War in America the bounty was at one time as high as \$900.

**Bourbon** (bör-bön), an ancient French family which has given three dynasties to Europe, the

Bourbons of France, Spain, and Naples. The first of the line known in history is Adhemar, who, at the beginning of the tenth century, was lord of the Bourbonnais (now the dep. of Allier). The power and possessions of the family increased steadily through a long scries of Archambaulds of Bourbon till in 1272 Beatrix, daughter of Agnes of Bourbon and John of Burgundy, married Robert, sixth son of Louis IX of France, and thus connected the Bourbons with the royal line of the Capets. Their son Louis had the barony converted into a dukedom and became the first Duc de Bourbon. Two branches took their origin from the two sons of this Louis, duke of Bourbon, who died in 1341. The elder line was that of the dukes of Bourbon, which became extinct at the death of the Constable of Bourbon in 1527, in the assault of the city of Rome. The younger was that of the counts of La Marche, after-ward counts and dukes of Vendôme. From these descended Anthony of Bourbon, duke of Vendôme, who by marriage acquired the kingdom of Navarre, and whose son Henry of Navarre, became Henry IV of France. Anthony's younger brother, Louis, prince of Condé, was the founder of the line of Condé. There were, therefore, two chief branches of the Bourbons -the royal, and that of Condé. The royal branch was divided by the two sons of Louis XIII, the elder of whom, Louis XIV, continued the chief branch, while Philip, the younger son, founded the house of Orleans as the first duke of that name. The kings of the elder French royal line of the house of Bourbon run XVI, XVI, XVII, AND Charles X, III, XIV, XV, XVI, XVII, XVII, AND Charles X. The last sovereigns of this line, Louis XVI, Louis XVII, and Charles X (Louis XVII, son of Louis XVI, and Charles X). never obtained the crown), were brothers, all of them being grandsons of Louis XV. Louis XVIII had no children, but Charles X, had two sons, viz., Louis Antoine de Bourbon, duke of Angoulême, who was dauphin till the revolution of 1830, and died without issue in 1844, and Charles Ferdinand, duke of Berry, who d. Feb. 14, 1820, of a wound given him by a political fanatic. The duke of Berry had two children: 1, Louise Marie Thérèse, called Mademoiselle d'Artois; and 2, Henri Charles Ferdinand Marie Dieudonné, b. in 1820, and at first called duke of Bordeaux, but afterwards Count de Chambord, who was looked upon by his party until his death (in 1883) as the legitimate heir to the crown of France.

The branch of the Bourbons known as the House of Orleans was raised to the throne of France by the revolution of 1830, and deprived of it by that of 1848. It derives its origin from Duke Philip I of Orleans (d. 1701), second son of Louis XIII, and only brother of Louis XIV. A regular succession of princes leads us to the notorious Egalité Orleans, who in 1793 died on the scaffold, and whose son Louis Philippe was king of France from 1830 to the revolution of 1848. His grandson, Louis Philippe, Count de Paris, b. Aug. 24, 1838, is the present head of the family, and since the death of Count de Chambord, the last male representative of the elder Bourbons, unites in himself the claims of both branches to the throne of France.

The Spanish-Bourbon dynasty originated when in 1700 Louis XIV placed his grandson Philip, duke of Anjou, on the Spanish throne, who became Philip V of Spain. From him descends the present infant occupant of the Spanish throne, Alphonso XII, b. in 1886.

The royal line of Naples, or the Two Sicilies, took its rise when in 1735 Don Carlos, the younger son of Philip V of Spain, obtained the crown of Sicily and Naples (then attached to the Spanish monarchy), and reigned as Charles III. In 1759, however, he succeeded his brother Ferdinand VI on the Spanish throne, when he transferred the Two Sicilies to his third son Fernando (Ferdinand IV), on the express condition that this crown should not be again united with Spain. Ferdinand IV had to leave Naples in 1806; but after the fall of Napoleon he again became king of both Sicilies under the title of Ferdinand I, and the succession remained to his descendants until 1860, when Naples was incorporated into the new kingdom of Italy.

**Bourbonnais** (bör-bon-ā), a former province of France, with the title first of a county, and afterward of a duchy, lying between Nivernais, Berry, and Burgundy, and now forming the department of the Allier.

**Bourdaloue** (bör-dà-lö), Louis (1632-1704), one of the great church orators of France, entered the order of the Jesuits, becoming teacher of rhetoric, philosophy, and morals in the Jesuit college of his native place. The lofty and dignified eloquence with which he assailed the vices of contemporary society brought him fame even at a time when Paris was ablaze with the feasts of Versailles, the glory of Turenne's victories, and the masterpieces of Corneille and Racine. His sermons are among the classics of France.

**Bourg** (börg) (or Bourg-en-Bresse), a town of Eastern France, capital of the dep. of Ain, well built, with a handsome parish church, public library, museum, monuments to Bichat, Joubert, and Edgar Quinet, and near the town the beautiful Gothic church of Brou, built in the early sixteenth century; some manufactures and a considerable trade. Pop, 18,968. **Bourgelat** (börzh-lä), CLAUDE (1712-1779),

**Bourgelat** (börzh-lä), CLAUDE (1712-1770), creator of the art of veterinary surgery in France. He established the first veterinary school in his native town in 1762, and his works on the art furnished a complete course of veterinary instruction.

**Bourgeois** (bur-j $\delta'$ ), a size of printing type larger than brevier and smaller than long-primer, used in books and newspapers.

**Bourgeoisle** (börzh-wá-zē), a name applied to a certain class in France, in contradistinction to the nobility and clergy as well as to the working classes. It thus includes all those who do not belong to the nobility or clergy, and yet occupy an independent position, from financiers and heads of great mercantile establishments at the one end to master tradesmen at the other. It corresponds pretty nearly with the English term "middle classes." Etymologically the word refers to the old class of freemen or burgesses residing in towns.

**Bourges** (börzh), an ancient city of France, capital of the dep. of Cher, situated at the confluence of the Auron and Yèvre, 124 mi. s. of Paris, formerly surrounded with ramparts, now laid out as promenades. It has crooked and gloomy streets, and houses built in the old style. The most noteworthy building is the cathedral (an archbishop's) of the thirteenth century, and one of the finest examples of Gothic in France. Bourges is a military center and has an arsenal, cannon foundry, etc., manufactures of cloth, leather, etc. Pop. 45,-342.

**BOURTMONT** (bör-mön), LOUIS AUGUSTE VIC-TOR DE GHAISNE, COMTE DE (1773-1846), marshal of France. Entering the republican army he distinguished himself under Napoleon, who made him a general of division. After the restoration he readily took service with the new dynasty, and in 1830 commanded the troops which conquered Algiers, a success which gained for him the marshal's baton. After the revolution of 1830 he followed the banished Charles X into exile, but latterly retired to his estate in Anjou, where he died.

**Bourrienne** (bö-rē-ān), FAUVELET DE (1769-1834), a French diplomatist, was educated along with Bonaparte at the school of Brienne. where a close intimacy sprang up between them. Bourrienne went to Germany to study law and languages, but returning to Paris in 1792, renewed his friendship with Napoleon, from whom he obtained various appointments, and latterly that of minister plenipotentiary at Hamburg. On the abdication of Napoleon he paid his court to Louis XVIII, and was nominated a minister of state. The revolution of July, 1830, and the loss of his wealth, affected him so much that he lost his reason, and died in a lunatic asylum. His Memoirs of Napoleon are valuable.

**Boussa** (bös'a) (or Bussang), a city of Africa, in the Soudan, on the Niger. It was here that Mungo Park met his death in 1805. Pop. est. 12,000 to 18,000.

Boutwell, GEORGE SEWALL (1818-), American statesman. In 1842 he was elected as a Democrat to the Massachusetts state legislature, where he sat until 1851. In 1851 and again in 1852, he was elected governor on the Free-soil ticket. He joined the Republican party in 1854. In 1862 he organized the internal revenue department, of which he was first commissioner. In 1863 he became member of Congress and was re-elected in 1865 and 1867. He was chairman of the committee to report articles of impeachment against Andrew Johnson, and one of the seven managers of the trial. He became secretary of the treasury in Grant's cabinet, which office he held until March, 1873, when he was chosen U.S. senator. Mr. Boutwell afterward practised in Washington, D. C., and in 1877 codified and tor. edited the statutes at large.

Bov'idæ, the ox family of animals, including the common ox, the bison, buffalo, yak,

zebu, etc. They are hollow-horned, ruminant animals, generally of large size, with broad, hairless muzzles and stout limbs, and most of them have been domesticated.

Bow, the name of one of the most ancient and universal weapons of offense. It is made of steel, wood, horn, or other elastic substance. The figure of the bow is nearly the same in all countries. The ancient Grecian bow was somewhat in the form of the letter  $\Sigma$ . In drawing it, the hand was brought back to the right breast, and not to the ear. The Scythian bow was nearly semicircular. The long-bow was the favorite national weapon in England. The battles of Crécy (1346), Poitiers (1356), and Agincourt (1415) were won by this weapon. It was made of yew, ash, etc., of the height of the archer, or about 6 ft. long, the arrow be-ing usually half the length of the bow. The arbalist, or cross-bow, was a popular weapon with the Italians, and was introduced into England in the thirteenth century, but never was so popular as the long-bow. In England the strictest regulations were made to encourage and facilitate the use of the bow. Merchants were obliged to import a certain proportion of bow-staves with every cargo; town councils had to provide public shooting butts near the town. Of the power of the bow, and the distance to which it will carry, some remarkable anecdotes are related. Thus Stuart (Athenian Antiquities i.) mentions a random shot of a Turk, which he found to be 584 yards. In the journal of King Edward VI it is mentioned that 100 archers of the king's guard shot at a 1-inch board, and that some of the arrows passed through this and into another board behind it, although the wood was extremely solid and firm.

**Bower-bird**, a name given to certain Australian birds of the starling family from a remarkable habit they have of building bowers to serve as places of resort. The bowers are



The Spotted Bower-bird.

constructed on the ground and usually under overhanging branches in the most ratired parts of the forest. They are decorated with variegated feathers, shells, small pebbles, bones, etc. At each end there is an entrance left open. These bowers do not serve as nests at all, but seem to be places of amusement and resort, especially during the breeding season. *The Satin Bower-bird* is so called from its beautiful glossy plumage, which is of a black color. Another common species is the *Spotted Bower-bird*, which is about 11 in. long, or rather smaller than the first mentioned, and less gay in color, but is the most lavish of all in decorating its bowers.

**Bowie**, JAMES (1790-1836), American frontiersman. He was notorious as a duelist, and, in 1827, was engaged in a médee at Natchez, in which six men were killed, and fifteen wounded. The knife with which he killed his opponent on this occasion was fashioned from a blacksmith's file, and was the original bowie-knife. He was killed by Mexican soldiery at the Alamo.

**Bowie-knife**, a long kind of knife like a dagger, but with only one edge, named after Colonel James Bowie, and used in America by hunters and others.

**Bow Instruments** are all the instruments strung with catgut from which the tones are produced by means of the bow. The most usual are the double-bass, the small bass, the tenor, and the violin proper. In reference to their construction the several parts are alike; the difference is in the size.

**Bow**, in music is the name of that wellknown implement by means of which the tone is produced from violins, and other instruments of that kind. It is made of a thin staff of elastic wood, tapering slightly till it reaches the lower end, to which the hairs (about 80 or 100 horsehairs) are fastened, and with which the bow is strung. At the upper end is an ornamental piece of wood or ivory called the *nut*, and fastened with a screw, which serves to regulate the tension of the hairs.

**Bow Bells**, the peal of bells belonging to the church of St. Mary-le-Bow, Cheapside, London, and celebrated for centuries. One who is born "within the sound of Bow Bells" is considered a genuine cockney.

is considered a genuine cockney. **Bow' ditch**, NATHANIEL, LL.D., F.R.S. (1773– 1838), an eminent American mathematician and astronomer, and president of the American Academy. His two principal works are *The American Practical Navigator* (1802), and an excellent translation of La Place's Mecanique *Céleste* (1829-38).

Bowdoin, JAMES(1727-1790), American statesman. He was a grandson of a French Huguenot who came to Portland, Me., in 1687, and went to Boston in 1690. James graduated af Harvard in 1745. He early manifested a scientific tendency of mind, and corresponded with Benjamin Franklin. He was a member of the general court of Massachusetts (1753-1756), and became councilor. The Bostonians thereafter elected him to the assembly. In 1774 he was elected a member of the Continental Congress; in 1775 he became president of the Massachusetts council, and in 1779 presided over the State Constitutional convention. In 1785 he became governor of the state of Massachusetts. He was a member of the convention that framed the Federal constitution.

23

#### Bowell

He was one of the founders and became the president of the American Academy of Arts and Sciences, and also a founder of the Massachusetts Humane Society. *Bocdoin College*, Brunswick, Me., was named after him. It is a flourishing institution, which has had among its students Longellow and Hawthorne.

**Bowell,** MACKENZIE (1823-), Canadian statesman, b. in Suffolk, England; came to Canada when a boy, and became editor of the Belleville, Ontario, *Intelligencer*. In 1867 he was returned to Parliament as a Conservative, was frequently re-elected, and became minister of customs and a member of the Privy Council in 1878.

Bowling Green, Warren co., Ky., on Barren River, 114 mi. s. of Louisville. Railroads: Louisville & Nashville, and Bowling Green & Memphis. Industries: two flouring mills, two iron foundries, five saw mills, two distilleries, and three planing mills. Surrounding country agricultural, some natural gas in vicinity. The town was first settled in 1797 and became a city in 1824. Pop. est. 1897, 12,000.

Bowls (Bowling), an ancient British game, still extremely popular. It is played on a smooth, level piece of greensward, generally about 40 yards long, and surrounded by a trench or ditch about 6 in. in depth. A • small, white ball called the jack is placed at one end of the green, and the object of the players, who range themselves in sides at the other, is so to roll their bowls that they may lie as near as possible to the jack. Each bowl is biased by being made slightly conical so as to take a curvilinear direction; and in making the proper allowance for this bias, and so regulating the cast of the ball, consist the skill and attraction of the game. The side which owns the greatest number of bowls next the jack, each bowl so placed constituting a point, carries off the victory.

**Bowsprit** (bū-'), the large boom or spar which projects over the stem of a vessel, having the foremast and fore-topmast stays and staysails attached to it, while extending beyond it is the jib boom.

**Box-elder**, the ash-leaved maple, a small but beautiful tree of the U. S., from which sugar is sometimes made.

**Boxing**, a manner of fighting with the fists. The art of boxing consists in showing skill in dealing blows with the fist against one's opponent, especially on the upper part of the body, while at the same time one protects one's self. In England professional boxers, who made a livelihood out of their skill in the art, were at one time common, especially during the reigns of the Georges, when persons of the highest rank were sometimes to be seen at pugilistic combats, and "professors" of the art frequently had members of the nobility among their pupils. Byron relates in his diary that he received instruction in boxing from the celebrated Jackson, who made a fortune as a pu-gilist. Boxing, has, however, now fallen in a great measure into disrepute, and prize fights are illegal in England, and both the principals and spectators may be proceeded against. At

### Boycotting

the gladiatorial shows of the Greeks and Romans boxing was common, but in a more dangerous form, the fist being armed with leather appliances loaded with iron or lead.

**Boxing the Compass,** in seaman's phrase, the repetition of all the points of the compass in their proper order—an accomplishment required to be attained by all sailors.

**Box-tortoise**, a name given to one or two North American tortoises that can completely shut themselves into their shell.

**Box-tree**, a shrubby evergreen tree, twelve or fifteen feet high, a native of England, Southern Europe, and parts of Asia, with small oval and opposite leaves, and greenish, inconspicuous flowers, male and female on the same tree. It was formerly so common in England as to have given its name to several places--Boxhill, in Surrey, for instance, and Boxley, in Kent. The wood is of a yellowish color, close grained, very bard and heavy, and admits of a beautiful polish. On these accounts it is much



Branch of the Common Box.

used by turners, wood carvers, engravers on wood (no wood surpassing it in this respect), and mathematical instrument makers. Flutes and other wind instruments are formed of it. The box of commerce comes mostly from the regions adjoining the Black Sea and Caspian, and is said to be diminishing in quantity. In gardens and shrubberies box trees may often be seen clipped into various formal shapes. There is also a dwarf variety reared as an edging for garden walks and the like.

Boyaca', in South America, one of the departments or provinces of Colombia. On the west side the country is traversed by a chain of the Andes, from which it slopes toward the east into immense plains or *Uanos*, mostly uncultivated, and watered by the tributaries of the Orinoco. Area 33,351 sq. mi.; pop. 609,874.

**Boy'cotting**, a name given to an organized system of social and commercial ostracism employed in Ireland in connection with the Land League and the land agitation of 1880 and 1881

and subsequently. Landlords, tenants, or other persons who are subjected to boycotting find it difficult or impossible to get any one to work for them, to supply them with the necessaries of life, or to associate with them in any way. It took its name from Captain James Boycott, a Mayo landlord, against whom it was first put in force. The practise has been legislatively declared illegal in many states of the Union.

Boy'dell, JOHN (1719-1804), an English engraver, but chiefly distinguished as an encourager of the fine arts. He engaged Reynolds, Opie, West, and other celebrated painters to illustrate Shakespeare's works, and from their pictures was produced a magnificent volume of plates, the Shakespeare Gallery.

**Boyden**, SETH (1758-1870), American inventor. He improved a machine for leather-splitting. In 1813 he and his brother established a leather-splitting business in Newark, N. J., and in 1819 made improved patent leather, which he sold until 1831. From 1831 until 1835 he engaged in producing malleable iron castings, and became interested in steam engines. He produced a variety of strawberries unequaled in size and flavor, and patented a hat-body doming machine.

**Boyer** (bwä-yā), ALEXIS (1757-1833), French surgeon. He had a brilliant career as a student, and was appointed first surgeon to Napoleon, receiving at the same time the title of Baron of the Empire.

**Boyer** (bwä-yā), JEAN PIERRE (1776-1850), president of the Republic of Hayti. It was largely by his efforts that in 1821 all parts of Hayti were brought under one republican government, of which he was chosen president. His administration in its earlier years was wise and energetic; but latterly financial difflculties and other causes made the Haytians dissatisfied with his rule, and a revolt drove him into exile in 1843.

**Boyesen,** HJALMAR HJORTH (1848–1896), Norwegian-American author: came to the U. S. in 1860. He was professor of languages at Urbana University, Ohio, from 1874 to 1880, then professor of German at Cornell, and filled a similar post at Columbia College, New York. He published *Gunnar* and other novels, *Idyls* of *Norway*, and many translations from the Scandinavian tongues.

**Boyle,** ROBERT (1620-1691), a celebrated natural philosopher, was the seventh son of Richard the first earl of Cork. He was one of the first members of the Royal Society. At Oxford, 1652, he occupied himself in making improvements on the air pump, by means of which he demonstrated the elasticity of air. Bovle was interred in Westminster Abbey.

**Boyle's Law,** otherwise called *Mariotte's Law*, a law in physics to the effect that the volume of a gas will vary inversely to the pressure to which it is subjected.

**Boyne**, a river of Ireland, which rises in the Bog of Allen, and after a course of sixty miles falls into the Irish Sea four miles from Drogheda. On its banks was fought the battle between the adherents of James II and William III in 1690, in which the latter proved victorlous, James being obliged to flee to the Continent. The anniversary of this victory (July 12) is still joyfully celebrated by Irish Protestants, and the playing of the "Orange" tune *Boyne Water*, is apt to excite the ire of Irish Catholics.

Bozzaris (bot-sä'ris), MARCO (1788–1823), a hero of the Greek war of independence against the Turks. After the fall of Suli he retired to the Ionian Islands, from whence he made a vain attempt to deliver his native country. In 1820, when the Turks were trying to reduce their overgrown vassal, Ali Pasha of Janina, to submission, the latter sought aid from the exiled Suliotes, and Marco Bozzaris returned to Epi-On the outbreak of the war of independrus. ence he at once joined the Greek cause, and distinguished himself as much by his patriotism and disinterestedness as by his military skill and personal bravery. In the summer of 1823, when he held the commander-in-chief of the Greek forces at Missolonghi, he made a daring night attack on the camp of the pasha of Scutari, near Karpenisi. The attack was successful; but the triumph of the Greeks was clouded by the fall of the heroic Bozzaris. His deeds are celebrated in the popular songs of Greece.

Brabançonne (brå-bån-son), the national song of the Belgians, written during the revolution of 1830 by Jenneval, an actor at the theater of Brussels, and set to music by Campenhout.

Brabant', the central district of the lowlands of Holland and Belgium, extending from the Waal to the sources of the Dyle, and from the Meuse and Limburg plains to the lower Scheldt. It is divided between the kingdoms of Holland and Belgium into three provinces: 1, Dutch, or North Brabant, area 1,977 sq. mi., pop. 480,996; 2, Belgian province of Antwerp, area 1,095 sq. mi., pop. 577,232; and 3, the Belgian province of South Brabant, area 1,276 sq. mi., pop. 985,274. In the north the inhabitants are Dutch; in the middle district, Flemings; in the south Walloons. Southward of Brussels the language is French; northward, Dutch and Flemish. In the fifth century Brabant came into possession of the Franks, and after being alternately included in and separated from Lorraine it emerges at length in 1190 as a duchy under a duke of Brabant. It eventually came by marriage into possession of the dukes of Burgundy, and passed with the last representative of that line, Mary of Burgundy, to the house of Austria, and finally to Philip II of Spain. In the famous revolt of the Netherlands, caused by the cruelties of King Philip and his agent, the Duke of Alva, North Brabant succeeded in asserting its independence, and in 1648 it was incorporated with the United Provinces. South Brabant remained. however, in possession of the Spaniards, and at the peace of Utrecht in 1714 passed again. along with the other southern provinces of the Netherlands, to the imperial house of Austria. Brabourne, Edward KNATCHBULL-HUGES-

sen, Lord (1829- ). English statesman; sat in

#### Braces

the House of Commons as a Liberal, 1857-1880. During this time he held several secretaryships and became a privy councillor. Mr. Gladstone gave him a peerage in 1880, and in 1885 he went over to the Conservatives. He is best known as the author of some delightful fairy stories.

**Braces,** in ships, ropes passing through blocks at the ends of the yards, used for swinging the latter round so as to meet the wind in any desired direction.

**Brachycephalic** (bra-ki-se-fal'ik), a term applied in ethnology to heads whose diameter from side to side is not much less than from front to back, as in the Mongolian type; opposed to *dolichocephalic*.

Bracken (Brake), a species of fern very common in Àmerica and Europe generally, and often covering large areas on hillsides and on un tilled grounds. It has a black creeping rhiwith < zome, branched pinnate fronds growing to the height often of several feet, and it



forms an ex- End of Branch, Common Brake.

cellent covert for game. The rhizome is bitter, but has been eaten in times of famine. The plant is astringent and anthelmintic; when burned it yields a good deal of alkali. The rhizome, a native of New Zealand, was formerly a staple article of food among the Maoris.

Bracket, a short piece or combination of pieces, generally more or less triangular in



Ornamental Brackets.

outline, and projecting from a wall or other surface. They may be either of an ornamental order, as when designed to support a statue, a bust, or such like, or plain forms of carpentry, such as support shelves, etc. Brackets may

# Braddock

also be used in connection with machinery, being attached to walls, beams, etc., to support a line of shafting.

**Brac' teates** (-&is), old coins of gold or silver. with irregular figures on them, stamped upon one surface only, so that the impression appears raised on one side, while the other appears hollow. *Bracteated* coins, coins of iron, copper, or brass, covered over with a thin plate of some richer metal, such as gold or silver.

**Bracton**, HENRY DE, one of the earliest writers on English law flourished in the thirteenth century. He studied law at Oxford, became a judge, and afterward chief-justice of England.

**Braddock,** Allegheny co., Pa., on the Monongahela River, 10 mi. s.e. of Pittsburg. Railroads: B. & O.; Pennsylvania; P. & L. E. Here are the Edgar Thomson Steel Works and other manufacturing concerns. Pop. est. 1897, 15,000.

Braddock, EDWARD (1695–1755), British soldier. He entered the Coldstream Guards. 1710, and was made lieutenant in 1716. After more than forty years of service he was made major general, March 29, 1754, and in September, commander of all British troops in America. He arrived at Hampton, Pa., Feb. 20, 1755. and debarked at Alexandria, where he met the Virginia levies for the expedition against the French at Fort Duquesne (near Pittsburgh, Pa.). By April 24, he had reached Frederick, Md., when he was forced to wait for wagons to transport his stores. He was joined there by Washington, whom he invited to be his aide-de-camp; and Benjamin Franklin, then postmaster-general of the colonies. He scorned the advice of Franklin regarding danger from the ambuscades of the Indians, saying: "These savages may, indeed, be a formidable enemy to raw American military, but upon the king's regular and disci-plined troops, sir, it is impossible that they should make an impression." He set out for Fort Cumberland, where all the forces were to assemble, and on June 7 they started by the path marked out by Washington two years earlier. Braddock's army consisted of 1,000 regulars, 30 sailors, 1,200 provincials, and a few friendly Indians, and on July 9 the advance division under Colonel Gates (afterward General Gates) was attacked by a band of French and Indians. Frightened by the warwhoop which they heard for the first time, the British fell back in confusion, and Braddock tried to rally them against their invisible foes. Familiar with Indian warfare, the Virginians separated, and sought shelter behind rocks and trees, but Braddock, dispensing with the "military instruction of a Virginia colonel" named George Washington, kept his men drawn up in platoons, and they fired at random into the forest, killing many of the Americans, and falling themselves with great rapidity. Braddock's personal bravery was conspicuous. Five horses were killed under him, and he was mortally wounded and borne from the field to die. The battle ended in a

rout, and of 1,460 men, including 89 commissioned officers, who had entered the field, 827 were killed or wounded. Of Braddock's aides Washington alone escaped, and he covered the retreat.

**Braddon,** MARY ELIZABETH (Mrs. John Maxwell) (1837-), a well-known novelist, born in London, and daughter of a solicitor there. After publishing some poems and tales, in 1862 she brought out Lady Audley's Secret, the first of a series of many clever sensational novels. She conducted the London magazine. Belgravia.

**Brad'ford**, an important manufacturing town in West Riding of Yorkshire, England. There is a large number of scientific, educational, and charitable institutions, among which may be mentioned the technical college, the free grammar school, endowed by Charles II, the fever hospital, built at a great cost, and the almshouses of the Tradesmen's Benevolent Society. There are several public parks, and an extensive system of waterworks which afford a supply of about 10 million gallons a day. Bradford is the chief seat in England of the spinning and weaving of worsted yarn and woolens. Pop. 216,361.

land of the spinning and weaving of worsted yarn and woolens. Pop. 216,361. **Bradford**, McKean co., Pa., 63 mi. s.e. of Dunkirk, N. Y. Railroads: Erie; W. N. Y. & P. Bradford is the center of the Northwestern Pa. oil fields. Industries: oil well supplies, tank factories, a refinery, railroad machine shops, saw and planing mills, nitroglycerine works, torpedo and sucker works, and a toothpick factory. Pop. est. 1897, 12,000.

pick factory. Pop. est. 1897, 12,000. **Brad'ford**, WILLIAM (1588-1657), a pilgrim father, the second governor of Plymouth Colony, b. at Austerfield, Yorkshire. He had a good patrimony, and is one of the few pilgrims who can be clearly shown to have had a gentle ancestry in England. B. went with the first colonists in the *Mayflower*, 1620, was the second governor of Plymouth Colony, New England. He wrote a history of the colony.

Bradlaugh (brad'la), CHARLES (1833-1891), English secularist, atheist, and advocate of republicanism. He is well known by his writings and lectures, and more especially by his efforts to gain admission to Parliament. Being elected for Northampton in 1880 he claimed the right to make affirmation simply instead of taking the oath which members of Parliament take before they can sit and vote, but being a professed atheist this right was denied him. Though he was repeatedly re-elected by the same constituency, the majority of the House of Commons continued to declare him disqualified for taking the oath or affirming; and it was only after the election of a new Parliament in 1885 that he was allowed to take his seat without opposition as a representative of Northampton. He was editor of the Nutional Reformer.

Brad ley, JAMES (1692-1762), English astronomer. He was appointed, in 1721, professor of astronomy at Oxford. Six years afterward he made known his discovery of the aberration of light, and his researches for many years were chiefly directed toward finding out methods for determining precisely that aberration. In 1741 Bradley was made astronomer-royal, and removed to Greenwich.

**Bradley**, JOSEPH P. (1813-1892), American jurist; graduated at Rutgers College in 1836, and was admitted to the bar in 1839. He practised as a railroad and insurance lawyer, and on March 21, 1870, was called to the supreme bench of the U. S. In early days he was a Whig in politics, became a Republican about 1856, and contested the sixth congressional district of New Jersey unsuccessfully in 1862. Justice Bradley was a member of the Hayes-Tilden electoral commission, where his expression in giving the decision to Hayes procured for him the nickname of "Aliunde Joe."

**Bradshaw**, JOHN (1586-1659), president of the High Court of Justice which tried and condemned Charles I. He studied law at Gray's Inn and attained a fair practise. When the king's trial was determined upon, Bradshaw was appointed president of the court; and his stern and unbending deportment at the trial did not disappoint expectation. Afterward he opposed Cromwell and the Protectorate, and was in consequence deprived of the chief-justiceship of Chester. On the death of Cromwell he became lord president of the council. At the restoration his body was exhumed and hung on a gibbet with those of Cromwell and Ireton.

**Bradstreet,** ANNE (1612-1672), the first American poet. She was a daughter of Gov. Thomas Dudley, and was married to Governor Bradstreet in 1628. Her complete works, prose and verse, have been published in Charlestown, Mass., 1868. In 1666 a fire destroyed her entire library. Her verses are founded on good English models, but lack originality, ease, and novelty.

Bradstreet, SIMON (1603-1697), early colonist. He was educated at Emmanuel College, Cambridge, and emigrated in 1630. He was chosen assistant judge of the court to be established in Massachusetts, and later was appointed secretary and agent of the colony, and commissioner of the United Colonies. He became one of the founders of Cambridge and of Andover, himself residing at Salem, Ipswich, and Boston. In 1653 he opposed the proposed making of war on the Hollanders of New York and the eastern tribe of Indians. In 1660 he went to England on the restoration of King Charles II, and acted as agent for the colony. From 1630 until 1679 he served as assistant, and from 1679 until 1686 he was governor of the colony. He was opposed to the severe measures of Governor Andros, after whose imprisonment he again became governor, and continued in office until 1692. When Sir William Phipps arrived with a new charter he became first councilor.

**Bra'dy**, NICOLAS (1659-1726). He was rector of the church of St. Catherine Cree, London, and latterly of Richmond, Surrey. He made a translation of the Æneid; but is only remembered now as the collaborateur of Nahum Tate in that version of the Psalms commonly used in the Episcopal Church. **Braga**, an ancient town in Northern Portugal, the seat of an archbishop who is primate of Portugal. There still exist remains of a Roman temple, amphitheater, and aqueduct. Pop. 20,258.

**Braganza** (or Bragan'ca), a town of Portugal, capital of the former province Trasosmontes, with a castle, the ancient seat of the dukes of Braganza from whom the present reigning family of Portugal are descended. Pop. 5,500.

**Braemar'**, a subdivision of the old district of Mar, in the s.w. of Aberdeenshire, Scotland, remarkable for the romantic grandeur of its scenery. It lies among the Grampian Mountains, and contains among other heights, Ben Macdhui (4,296 ft.), Cairntoul (4,245), Braeriach (4,225), Cairngorm (4,090), Ben-a-Buird (3,809), Ben Avon (3,826), and Lochnagar (3,786). B. is traversed by General Wade's great military road from Blairgowrie to Fort George. Pop. 482. Balmoral, the highland residence of the queen of England, lies toward the e., and in the heart of the parish is the village of Castleton, the great resort of tourists.

Bragg, BRAXTON. soldier (1817-1876), b. in North Carolina. He graduated at the U.S. military academy in 1837, appointed second lieutenant of the third artillery, and served against the Seminoles in Florida. In 1846, he was brevetted captain for gallant conduct in defending Fort Brown, Texas, and was made He served in the Mexican War and captain. fought at Monterey and Buena Vista. In 1856 he resigned from the army and engaged in planting in Louisiana. At the beginning of the Civil War he was appointed brigadier general in the Confederate army, and placed in command at Pensacola, Fla. In 1862, he became major general in command of the second division of the Confederate army. At the battle of Shiloh, April 6, 7, 1862, he commanded the entire Southern army. After the evacuation of Corinth he succeeded General Beauregard in command of the department. After the bat-tle of Perryville, October 8, he retreated to He was removed from his com-Tennessee. mand, and placed under arrest, but was restored to his division, and fought with Rosecrans at Stone River, at Murfreesboro, Dec. 31, 1862, and Jan. 2, 1863, and was defeated. He encountered Rosecrans again at Chickamauga. Sept. 19, 20, 1863, and was victorious. General Grant defeated him at Chattanooga, Nov. 23-25, 1863, and in December, General Bragg was relieved from command at his own request. He was called to Richmond to act as military adviser to Jefferson Davis, with whom he was a favorite. In 1864 he led a small force from North Carolina to Georgia to operate against General Sherman, but was unsuccessful. After the war he passed his life in retirement, but at one time he was chief engineer for the state of Alabama, and he superintended the improve-ments in Mobile Bay. His brother Thomas (1810-1872) was governor of North Carolina in 1854-58, U. S. senutor in 1859, and attorney general of the Confederacy 1861-63.

Bragg, EDWARD S. (1827), removed to Fond

du Lac, Wis., in 1849. practised law there, and in 1854 became district attorney. He was commissioned captain May 5, 1861, fought in the Army of the Potomac, and came out of the war a brigadier general. Bragg's "Iron Brigade" will be long remembered. General Bragg, who is as good a talker as he showed himself a fighter, was always a Democrat, and in 1877 served a term in the Wisconsin legislature. In 1876 he was sent to Congress, served by re-election until March, 1883, and was again elected in November, 1884.

Braham (brā'am), JOHN (1771-1856), a celebrated tenor singer of Jewish extraction. He appeared with great success on the leading stages of France. Italy, and the U. S., as well as in his own country. He excelled mainly in national songs, such as *The Bay of Biscay*, O, and *The Death of Nelson*, and continued to attract large audiences even when eighty years of age.

Brahe (brä'ä), TYCHO (1546–1601), Danish astronomer. He studied law at Copenhagen and Leipsic, but from 1565 gave himself up to astronomy, and in 1580 built an observatory on the island of Hveen in the sound, providing it with the best implements then procurable. Here he excogitated the planetary system associated with his name, the earth, by his theory, being regarded as the center of the heavenly bodies. He is chiefly remarkable for his services to practical astronomy, his observations being superior in accuracy to those of his predecessors.

**Brah** ma, a Sanskrit word signifying (in its neuter form) the Universal Power or ground of all existence, and also (in its masculine form with long final syllable) a particular god, the first person in the Triad (Bramā, Vishnu, and Siva) of the Hindus. The personal god Brahmā is represented as a red or goldencolored figure with four heads and as many arms, and he is often accompanied by the swan or goose. He is the god of the Fates, master of life and death, yet he is himself created, and is merely the agent of Brahmā, the Universal Power. His moral character is no better than that of the Grecian Zeus.

Brah' manism, a religious and social system prevalent among the Hindus, and so-called because developed and expounded by the sacerdotal caste known as the Brahmans. It is founded on the ancient religious writings known as the Vedas and regarded as sacred revelations, of which the Brahmans as a body became custodians and interpreters, being also the officiating priests and the general directors of sacrifices and religious rites. As the priestly caste increased in numbers and power they went on elaborating the ceremonies, and added to the Vedas other writings tending to confirm the excessive pretensions of this now predominant caste, and give them the sanction of a revelation. In time the caste of Brahmans came to be accepted as a divine institution, and an elaborate system of rules defining and enforcing by the severest penalties its place, as well as that of the inferior castes, was promulgated. Other early castes

were the Kshattriyas or warriors, and the Vaisyas or cultivators, and it was not without a struggle that the former recognized the superiority of the Brahmans. It was by the Brahmans that the Sanskrit literature was developed; and they were not only the priests, theologians, and philosophers, but also the poets, men of science, lawgivers, administrators, and statesmen of the Aryans of India.

The sanctity and inviolability of a Brahman are maintained by severe penalties. The murder of one of the order, robbing him, etc., are inexpiable sins; even the killing of his cow can only be explated by a painful penance. A Brahman should pass through four states: First, as Brahmachari, or novice, he begins the study of the sacred Vedas, and is initiated into the privileges and the duties of his caste. He has a right to alms, to exemption from taxes, and from capital and even corporal punishment. Flesh and eggs he is not allowed to eat. Leather, skins of animals, and most animals themselves are impure, and not to be touched by him. When manhood comes he ought to marry, and as Grihastha enter the second state, which requires more numerous and minute observances. When he has begotten a son and trained him up for the holy calling he ought to enter the third state, and as Vanaprastha, or inhabitant of the forest, retire from the world for solitary praying and meditation, with severe penances to purify the spirit; but this and the fourth or last state of a Sannyasi, requiring a cruel degree of asceticism, are now seldom reached, and the whole scheme is to be regarded as representing rather the Brahmanical ideal of life than the actual facts.

The worship represented in the oldest Vedic literature is that of natural objects: the sky, personified in the god Indra; the dawn, in Ushas; the various attributes of the sun, in Vishnu, Surya, Agni, etc. These gods were invoked for assistance in the common affairs of life, and were propitiated by offerings which, at first few and simple, afterward became more complicated and included animal sacrifices. In the later Vedic hymns a philosophical conception of religion and the problems of being and creation appears struggling into existence; and this tendency is systematically developed by the supplements and commentaries known as the Brahmanas and the Upanishads. In some of the Upanishads the deities of the old Vedic creed are treated as symbolical. Brahma, the supreme soul, is the only reality, the world is regarded as an emanation from him, and the highest good of the soul is to become united with the divine. The necessity for the purification of the soul in order to its reunion with the divine nature gave rise to the doctrine of metempsychosis or transmigration.

This philosophical development of Brahmanism gave rise to a distinct separation between the educated and the vulgar creeds. While from the fifth to the first century B.c. the higher thinkers among the Brahmans were developing a philosophy which recognized that there was but one god, the popular creed had concentrated its ideas of worship round three

great deities-Brahmä, Vishnu, and Siva, who now took the place of the confused old Vedic Pantheon. Brahmä, the creator, though considered the most exalted of the three, was too abstract an idea to become a popular god, and soon sank almost out of notice. Thus the Brahmans became divided between Vishnu, the preserver, and Siva, the destroyer and re-producer, and the worshipers of these two deities now form the two great religious sects of India. Siva, in his philosophical significance, is the deity mostly worshiped by the conventional Brahman, while in his aspect of the destroyer, or in one of his female manifestations, he is the god of the low castes, and often worshiped with degrading rites. But the highly cultivated Brahman is still a pure theist, and the educated Hindu in general professes to regard the special deity he chooses for worship as merely a form under which the One First Cause may be approached.

The system of caste originally, no doubt, represented distinctions of race. The early classification of the people was that of "twiceborn" Aryans (priests, warriors, husbandmen) and once-born non-Aryans (serfs); but intermarriages, giving rise to a mixed progeny, and the variety of employments in modern times, have profoundly modified this simple classification. Innumerable minor distinctions have grown up, so that among the Brahmans alone there are several hundred castes who cannot intermarry or eat food cooked by each other.

The Brahmans represent the highest culture of India, and as the result of centuries of education and self-restraint have evolved a type of man distinctly superior to the castes around them. They have still great influence, and occupy the highest places at the courts of princes. Many, however, are driven by need or other motives into trades and employments inconsistent with the original character of their caste.

Brahmaputra, a great river of India. Rises in Thibet, flows through Assam and Bengal and falls into the Bay of Bengal. It is navigable for about 800 mi. from the sea, its total length being, perhaps, 1,800 mi.

Brahmo-Somaj or the Theistic Church of India, was founded in 1830 by an enlightened Brahman, who sought to purify his religion from impurities and idolatries. This church, while accepting what religious truth the Vedas may contain, rejects the idea of their special infallibility, and founds its faith on principles of reason. The members do not in principle recognize the distinction of caste, and have made great efforts to weaken this as well as other prejudices among their countrymen.

Brahms, JOHANNES, (1833-1897). a great German composer, introduced to the world by Schumann and a bitter opponent of Wagner and the Wagnerian school of music.

**Braila**, a town in Roumania, formerly a fortress on the Danube. The export of grain and the sturgeon fisheries are among the principal industries in Braīla. Pop. about 32,000.

Brain, the center of the nervous system, and

the seat of consciousness and volition in man and the higher animals. See Anatomy.

**Brainerd**, Crow Wing co., Minn. on the Mississippi River, 115 mi. w.s.w. of Duluth. Railroad: Northern Pacific. Brainerd is a trade center and has railroad shops and a saw-mill. Pop. est. 1897, 6,500.

Brake, a contrivance for retarding or arresting motion by means of friction. In machinery it generally consists of a simple or compound lever, that may be pressed forcibly upon the periphery of a wheel, fixed upon a shaft or axis. A similar contrivance is attached to road and railway carriages, but continuous brakes applied to every pair of wheels in a railway train, and operated by air either by the compression or vacuum method, are now generally used on railways. By the first method, of which the Westinghouse brake is an example, the air is compressed by a pump on the locomotive and conveyed by pipes and tubes to cylinders which are under each car, and the pistons of which act on the brake-levers. In the *racuum* method, exemplified in the Lough-ridge brake, the air is exhausted from the device beneath the car, and the pressure of the atmosphere operates the brake-levers.

**Bram'ah**, JOSEPH (1749-1814), the inventor of the Bramah lock, the Bramah press, etc. He set up business in London as manufacturer of various small articles in metal-work, and distinguished himself by a long series of inventions, such as improvements in paper making, fire engines, printing machines, etc. He is especially known for an ingeniously constructed lock and for the hydraulic press (which see).

**Bramante** (brå-mån'tā), FRANCESCO LAZZARI (1444-1514), a great Italian architect. He was patronized by the popes, and his first great work at Rome was the union of the straggling buildings of the Vatican with the Belvedere gardens, so as to form one fine whole. But his greatest work was the part he had in the building of the new church of St. Peter at Rome, of which he was the first architect.

**Bram'ble**, the name commonly applied to the bush with trailing prickly stems which



Branch of Common Bramble. a.-Flower; b.-Fruit.

bears the well-known berries usually called in Scotland brambles, and in England black-

berries. It is similar to the raspberry, and belongs to the same genus, natural order Rosaceæ. It is rarely cultivated, but as a wild plantit grows in great abundance. The flowers do not appear till late in the summer, and the fruit, which is deep purple or almost black in color, does not ripen till autumn.

**Bran**, the husky part of wheat separated by the bolter from the flour. Its components are: water, 13; gluten, 19.5; fatty matter, 5; husk with starch, 55; and ashes, 7.5; but the results of different analyses vary considerably. It is employed in feeding cattle, and has also been found useful as a manure.

**Bran denburg**, a province of Prussia. The province produces much grain, as well as fruits, hemp, flax, tobacco, etc., and supports many sheep. The forests are very extensive. Berlin is locally in Brandenburg. Area 15,400 sq. mi.; pop. 4,120,577, including the city of Berlin. The Old Mark of Brandenburg was bestowed by the emperor Charles IV on Frederick of Hohenzollern, and is the center round which the present extensive kingdom of Prussia has grown up. The town Brandenburg is on the Havel 35 mi. w.s.w. of Berlin, and has considerable manufactures, including silk, woolens, leather, etc. Pop. 33,129.

Brandy, the liquor obtained by the distillation of wine, or of the refuse of the winepress. It is colorless at first, but usually derives a brownish color from the casks in which it is kept, or from coloring matter added to it. The best brandy is made in France, particularly in the Cognac district in the department of Charente. Much of the so-called brandy sold in Britain and America is made there from more or less coarse whisky, flavored and colored to resemble the real article; and France itself also exports quantities of this stuff. Brandy is often used medicinally as a stimulant, stomachic, and restorative, or in mild diarrhœa. In America various distilled liquors get the name of brandy, as cider brandy, peach brandy.

Brandywine Creek, a small river which rises in the state of Pennsylvania, passes into the state of Delaware, and joins Christiana Creek near Wilmington. It gives its name to a battle fought near it Sept. 11, 1777, between the British and Americans, in which the latter were defeated.

**Brank** (or Branks), an instrument formerly in use in Scotland, and to some extent also in England, as a punishment for scolds. It consisted of an iron frame which went over the head of the offender, and had in front an iron plate which was inserted in the mouth, where it was fixed above the tongue, and kept it perfectly quiet.

perfectly quiet. Brant, JOSEPH (1742-1807), Indian chief, b. in Ohio. At the age of thirteen he accompanied his two elder brothers, who participated in Sir William Johnson's campaign against the French at Lake George. He was sent to the Rev. Eleazar Wheelock's Indian school at Lebauon, Conn., became interpreter to a missionary in 1772, and was frequently employed by Sir William Johnson as au agent

among various tribes. During the Revolution the Mohawks adhered to the British, and Brant went to England. In 1776 he returned to Canada, and received a commission in the British army, in which he attained the rank of colonel, but was always known as captain. He participated in the battle of Oriskany, Aug. 6, 1777, one of the bloodiest engagements of the war, and led the Indians in many raids on the borders of New York. He was not present at the massacre of Wyoming. Brant laid waste the Mohawk Valley with 300 Indians and Tories. After the war the Six Nations found that they had no mention in the treaty, and Brant asked for a tract of land on the north shore of Lake Erie, which was granted. Here he labored for the improvement of his people, and tried to form a confed-eracy of tribes in Western Canada, but failed. He visited England again in 1785, raised funds to build a church, and received compensation to repair the losses his nation had incurred in sustaining the English. He held that his people had a right to the territory n.w. of the Ohio. He was present at the defeat of Gen. Arthur St. Clair on the Miami River in 1791. Later he visited the U.S. His youngest son. John, became a chief, and took part in the War of 1812.

**Brant' ford,** a flourishing town of Canada, prov. Ontario, on the Grand River (which is navigable) 24 mi. w.s.w. of Hamilton; it has railway machine shops, foundries, and an active trade. Pop. 12,753.

Brass is an alloy of copper and zinc, of a bright yellow color, and hard, ductile, and malleable. The best brass consists of two parts by weight of copper to one of zinc; but any degree of variation may be obtained by altering the proportions; thus by increasing the quantity of zinc we may form tombac and pinchbeck, and with nearly a seventh more of zinc than copper the compound becomes brittle and of a silver-white color. By increasing the copper, on the other hand, the compound increases in strength and tenacity. Brass which is to be turned or filed is made workable by mixing about 2 per cent. of lead in the alloy, which has the effect of hardening the brass and preventing the tool being clogged. For engraving purposes a little tin is usually mixed with the brass. Brass is used for a great variety of purposes, both useful and ornamental. The working of brass requires considerable skill. First the brass is roughly cast in the foundry. It is brought thence to the finishing bench, where an alloy of copper and tin is cast in molding-sand. The brass molders work at troughs in which is kept the molding-sand which is so cohesive that it may be formed as desired. The flask in which the sand is packed around the pattern is made of two frames. one fitting over the other. One frame has little legs of wood called dowels, and the other has holes in which these dowels fit, so that when these frames are brought together one will remain over the other. The frames are made of four pieces of wood fitted up with hinge-like corner-pieces so that the frame can be un-

locked and taken away from the sand without disturbing it. The molder fills one of the frames with sand. In the center and on top of the sand he lays the pattern and presses it into the sand and then fits the other frame over it. He shakes some fine sand over the pattern and fills the upper frame with molding-sand which he rams down hard. He then scrapes the surplus sand from the top frame with a stick and runs a pointed wire into the sand toward the pattern, thus providing escapes for the gases which form when the molten metal is poured in. He then turns over both frames and carefully lifts the bottom frame exposing the pattern imbedded in the same. The pattern is withdrawn by driving a steel pin into the wood or by means of a screw pin made for the purpose. If the casting is to be hollow the cores are now put in place. A core is made of sand and paste and rammed into molds and afterward baked in a large oven. When the cores are laid in place in the hollow space left by the pattern the channels are scooped out, the frames placed together, and the woodwork taken off and the short board with a block of sand on it, is laid on the floor. False core work is required for some purposes. A false core is a part of the mold built up separate from the mold proper, and, as it is in small pieces it can be taken out without removing the pattern. Thus a bust can be buried in the sand, but its rounded irregular form, ifs deep cut and incurving impressions, make it impossible to withdraw it from the sand without bringing part of the mold with it. This is avoided by making a mold out of sand packed so tight and hammered so close into the different parts of the pattern that each part can be taken away. and when the pattern is removed can be properly put together again to form the mold. The brass is melted in crucibles which are lifted out of the furnace, carried to the molds and emptied into the gate, thus filling the hollow in the sand. The castings which are to be polished are cleaned in water and acids and then buffed or burnished. Sometimes they are finished by being dipped into solutions of nitric acid and water. If a dead finish is desired the acid solution is much weaker than if a bright finish is wanted. In burnishing, the brass is brought to a high finish by being rubbed with polished steel tools, or it is held against buffing wheels which are made of cotton. A red polish mixture is put on the wheel and the high speed polishes the brass. This wheel however, can be used only on smooth and regular surfaces. The brilliancy and polish of brass may be preserved by lacquer, which is put on and dried in an oven. Brass is spun, stamped, pressed, and drawn in the same manner as copper, gold, or silver.

**Brasses** (Sepulchral or Monumental), large plates of brass inlaid in polished slabs of stone, and usually exhibiting the figure of the person intended to be commemorated, either in a carved outline on the plate or in the form of the plate itself. In place of the figure we sometimes find an ornamented cross. The earliest example of these monumental slabs now existing in England is that on the tomb of Sir John D'Abernon (d. 1277) at Stoke D'Abernon in Surrey. These brasses are of great value in giving an exact picture of the costume of the time to which they belong.

**Brassey,** THOMAS (1805-1870), an English railway contractor. His operations were on an immense scale, and extended to most of the European countries, as well as to America, India, and Australia, one of his greatest works being the Grand Trunk Railway of Canada, with the great bridge over the St. Lawrence at Montreal. His son, Thomas, b. 1836, now Lord Brassey, was civil lord of the admiralty in 1880-84. His wife wrote Voyage of the Sunbeam and other works descriptive of yachting cruises and travels. She d. in 1888.

Brattleboro, Windham co., Vt., is one of the richest towns in the state; site of the state insane asylum; has 2 banks, several churches and factories, 4 papers. Pop. 6,900. Brazil, a country of South America, and the

**Brazil**, a country of South America, and the third largest political division of the Western Continent, having a length of 2,660 mi., and a breadth of 2,705 mi. between extreme points. Its coast line extends from Cape Orange on the north to Rio Chuy on the south, a distance of nearly 4,000 mi. It borders on every state in South America except Chile, but the boundary lines with some of them are still in dispute. The area of Brazil is about 3,219,000 sq. mi., or nearly one half of the South American continent.

Physical Features .- Brazil is a triangularshaped country, occupying the eastern angle of the continent. It lies almost wholly within the tropics, and is still in great part unexplored and unsettled. On the north and west are the great depressions of the Amazon and Paraguay rivers, which comprise large areas of floodplains and swamps, heavily wooded, and al-most uninhabitable. The upper coast is bordered by low, alluvial bottom-lands and sandy plains, full of lakes, and in places very sterile; while the southern angle of the country is rolling campo land, bordered by a low sandy coast. Above its eastern angle a large area of coastlands and neighboring plateau is subject to periodical devastating droughts. The interior of the country, however, is a high plateau, with a general elevation of 1,000 to 3,000 feet, irregularly ridged by mountains and deeply cut by large rivers. The mountainous ranges of the maritime system form the eastern margin of this plateau, the easternmost of which is known as the Serra do Mar. This range plays an important part in the development of Brazil, for it is a costly barrier to communication with the interior, and turns nearly all the great rivers inland to find outlets through the distant Amazon and La Plata. To the west of the maritime system the elevated table-lands of the Paraná and San Francisco make great bay-like indentations in the northern and southern margins of the mountainous area, nearly uniting about the headwaters of the latter. To the westward of these plains there is a second range, nearly parallel with the maritime system, constituting the mountains

of Goyaz. To the westward of these come the great elevated plains of the Amazonian and Upper Paraguayan regions. The mountains are composed almost exclusively of uplifted strata of great geological age, gneiss and metamorphic schists, with granite and other eruptive rocks. The great elevated plains are composed of horizontal strata dating from the Silurian Age, so profoundly modified by the deep excavations of the valleys that this part of the country is generally, but erroneously, represented as mountainous. Brazil possesses Plata, and San Francisco. The Amazon, La its tributaries drain fully a half of the country. To the east of the Madeira these tributaries are table-land rivers, broken by rapids and freely navigable for comparatively short dis-West of the Madeira they are lowland tançes. rivers, sluggish, bordered by extensive floodplains, and afford free navigation for long dis-The La Plata system drains nearly tances. one fifth of the country through its three branches—the Paraguay, Parana, and Uruguay. The first of these is a lowland river, freely navigable for a long distance, while the other two are table-land rivers, full of obstructions, and without free outlets for their upperlevel navigation. The San Francisco is a table-land river, flowing northeast between the Goyaz and maritime mountains, and then, breaking through the latter, southeast to the Atlantic. Its tributaries are comparatively short, and nearly disappear along the lower river in the region of slight rainfall. It is not freely navigable because of the Paulo Affonso short, the longest being the Parahyba, and have but little utility for navigation. The climate of Brazil varies greatly—the lowlands of the Amazon and a great part of the coast being hot, humid, and unhealthy, while the tablelands and some districts of the coast swept by the tradewinds are temperate and healthy.

The vegetation of Brazil is luxuriant and varied. The vast forests of the Amazon contain hundreds of species of trees, draped and festooned by climbing plants, lianas, orchids, etc. Rosewood, Brazilwood, and others supply valuable timber; tropical fruits are abundant, and other products are noted in the section on commerce. The number of species of animals is also very large, but the individuals in each are comparatively few. Beasts of prey are the jaguar, puma, tiger-cat, and ocelot; the other animals include the monkey, tapir, capybara. peccary, ant-eater, sloth, and boa-constrictor. Alligators, turtles, porpoises, and manatees swarm in the Amazon; and among birds, the parrots and humming-birds are especially numerous.

*Population.*—The population of Brazil is about 13,540,000. The proportion of non-producers is very large, the natural conditions of the country rendering labor but slightly necessary to meet the ordinary requirements of life. The institution of slavery has had much to do with this state of things, by degrading manual labor,

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and making idleness respectable. The African slave trade was prohibited in 1831, but did not actually cease until 1854. In 1871 a gradual emancipation law was adopted, which declared the children b. thereafter of slave mothers to be free, but obliged to serve the mother's master until the age of twenty-one years. It also provided for a fund with which to liberate slaves by purchase. The number of slaves registered in 1873 under this law was 1,540,796. Through the operations of the fund 30,014 slaves had been ransomed up to the beginning of 1887. The number of slaves voluntarily liberated and ransomed through private efforts was very large, and two provinces (Ceará and Amazonas) had been declared entirely free. In 1885 a second law was adopted, providing for a new registry, declaring all sexagenarians free, but with obligatory service until the age of sixty-five years, and fixing an official valuation on all slaves, to prevent further abuses of the emancipation fund. The official returns of the registry under this law (closed March 31, 1887), gave 723,419: the number of sexa-genarians liberated was about 100,000, and the number enrolled for obligatory service under the law was 18,946. Finally, by the law of May 13, 1888, immediate and unconditional emancipation was decreed, although Brazil had been unable wholly to replace the system of slave labor. Immigrant labor was still limited, the poorer rural population was both untrained and opposed to habits of industry, and the labor of freed slaves had hitherto been utilized only to a limited extent. Recent events, however, have proved that kind treat-ment and good pay will keep a very large percentage of the freedmen on the plantations.

The Roman Catholic is the established religion and is supported by the state: but all other sects are tolerated. There are, however, less than 30,000 non-Catholics in the country. Education is compulsory in several provinces, but is still in a very backward condition. The language is Portuguese, with different dialects. *Political Divisions.*—The government of Bra-

Political Divisions.—The government of Brazil, or the United States of Brazil, comprises twenty states and a federal district. These states are Alagoas, Amaxonas, Bahia, Ceara', Esprito Santo, Goyaz, Maranhao, Matto Grosso, Minas Geraes, Para, Parahyba, Parana, Pernambuco, Piauby, Rio de Janeiro (city), Rio de Janeiro, Rio Grande do Norte, Rio Grande do Sul, Sao Paulo, Santa Catharina, and Sergipe. Each state has a local republican government with governor and legislature elected by the people. The executive and legislative officers of the general government consist of a president and a vice-president chosen by electors, a chamber of deputies, elected by the people, and a senate elected by the legislatures of the states. Each state is entitled to three senators and one member of the chamber of deputies for each 70,000 population. The army of Brazil consists in time of peace of 13,500 men, and the navy of 43 vessels with about 6,000 officers and men.

Commerce.—Agriculture, mining, and forest products are the principal industries of Brazil.

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Manufacturing is as yet little developed. The coast fisheries have been neglected, although Brazil is a large consumer of cod fish. Forest products are rubber, mate, nuts, cocoa, medicinal plants, cabinet and dye woods. Coffee is the greatest of the agricultural products, and furnishes about two thirds of the total exports of the nation. Sugar ranks second in importance as an export, and the production of cotton and tobacco has decreased, and that of tapioca has nearly disappeared. Rice, maize, and other products are grown to a limited extent. Gold and diamonds are found in some of the states, but the annual production at present is not large. There are a few iron mines producing ore of superior quality, but the absence of coal is a serious obstacle to the development of this industry. The inhabit-The inhabitants of the southern states of the republic are much more industrious and energetic than those who live in the northern states. Several German colonies are located in the southern states. Brazil is now in steamship and telegraphic communication with all the world. The first railway was opened in 1854, and there are now about 8,000 miles completed and in process of construction. The roads have been constructed for the most part directly or indirectly by government aid. There are about 10,000 miles of telegraph lines in the country.

History.—Brazil was first discovered in 1500, by Pinzon, who landed at Cape St. Augustine and then followed the coast north to the mouth of the Orinoco. In the same year a Portuguese expedition to the East Indies, under Pedro Alvarez Cabral, discovered the Brazilian coast near Porto Seguro. Cabral took formal possession, and named his new discovery "Terra da Vera Cruz." Two Portuguese expeditions were sent out in 1501 and 1503, exploring the coast and planting a colony, and bringing back a rich cargo of brazilwood.

In 1530 the Portuguese government resolved upon the definite settlement of Brazil, and the plan adopted was its division into hereditary captaincies, which should be granted to private individuals, with ample powers for the founding of colonies on their own account. Many of the earliest colonies failed through lack of means, and from inability to hold their ground against the natives. In 1567 a Huguenot colony, established on the bay of Rio de Janeiro 12 years before, was overthrown by the Portuguese, who then founded the present capital of Brazil. Portugal and her colonies having become dependencies of Spain, a squadron sent out by the Dutch in 1623 to seize Brazil captured the colonial capital, Ba-The Dutch lost the city in 1625, but in hia. 1630 they captured Pernambuco, which, with several neighboring places, they held for over 20 years. In 1640 Portugal regained her independence, and in 1654 her former possessions, but without any definite settlement of her boundary disputes with Spain. To strengthen her claim to the territory on the eastern shore of the La Plata, the town of Colonia, opposite Buenos Ayres, was founded in 1679; this was the beginning of a bitter struggle for the

present republic of Uruguay, lasting nearly 150 years, until the independence of that territory was formally recognized in 1827 by Dom Pedro I. The discovery of gold in Minas Geraes in 1693, and of diamonds in 1729, gave a new impetus to the growth of the country, one result of which was the removal of the colonial capital from Bahia to Rio de Janeiro. The cultivation of cotton, tobacco, and sugar cane had already attained great prominence and prosperity in the northern captaincies. The colonial system of Portugal, however, was one of selfish exclusion and greedy exlortion. The colony was rigidly closed to foreigners, industry was burdened by restrictions and monopolies, the taxes were farmed out, the authorities were arbitrary and grasping, the administration of justice was slow and corrupt, printing was forbidden, the people were grossly ignorant, turbulent, and immoral, and internal communication was slow and difficult. In 1808 the royal family of Portugal was expelled by the French and took refuge in Brazil, and the very first act of Dom João VI was to open Brazilian ports to foreign commerce. He then removed various restrictions on domestic industries, founded a printing office and library, created new courts, and opened various schools and public institu-tions. All these acts greatly stimulated the tions. growth of the country. In 1821 he returned to Portugal, leaving his eldest son in Brazil as prince regent. Personal ambition, and the advice of men opposed to government from Lisbon, led the young prince to declare for Brazilian independence, Sept. 7, 1822. He was proclaimed and crowned emperor-as Dom Pedro I-before the end of the year, the small Portuguese force in the country being quickly and easily expelled. The constitution was ratified and sworn to early in 1825, and some amendments were added in 1835. The new empire, however, did not start smoothly, nor was the reign of Dom Pedro I a fortunate one. Vexed with the opposition encountered, he in 1831 voluntarily abdicated in favor of his eldest son, and withdrew to Portugal. During the next nine years Brazil was governed by regencies, but in 1840 a popular agitation led to the declaration of the young prince's majority, at 15 years of age, and to his coronation the following year as Dom Pedro II. The reign of this sovereign was one of almost unbroken peace (save for one or two insignificant revolutionary outbreaks and disputes with neighboring states) until Nov. 15, 1889, when he was dethroned, he and his family exiled, and Brazil declared a republic, under the title of the United States of Brazil.

**Brazil**, Clay co., Ind., 16 mi. e.n.e. of Terre Haute. Railroads: Vandalia; C. & E. I. In the Indiana block coal district. Has numerous collieries and extensive iron blast furnaces. Also manufactures of boilers, chairs, terra cotta, etc. Pop. est. 1897, 7,000.

**Brazilwood,** a kind of wood yielding a red dye obtained from several trees native of the West Indies and Central and South America. The wood is hard and heavy, and as it takes on a fine polish it is used by cabinet-makers for various purposes, but its principal use is in dyeing red. The dye is obtained by reducing the wood to powder and boiling it in water, when the water receives the red coloring principle, which is a crystallizable substance called *brazilin*. The color is not permanent unless fixed by suitable mordants.

**Brazos** (brä'zōs), a large river of Texas, rising in the w. part of the state and flowing into the Gulf of Mexico after a course of 900 mi., 40 mi. w.s.w. Galveston. During the rainy season, from February to May inclusive, it is navigable by steamboats for about 300 miles.

**Brazza** (bråt'så), an island in the Adriatic, part of Dalmatia, 24 mi. long and from 5 to 7 broad, mountainous and well wooded. It produces good wines and oil, almonds, silk, etc. Pop. about 20,000.

Bread is the flour or meal of grain kneaded with water into a tough and consistent paste and baked. There are numerous kinds of bread, according to materials and methods of preparation; but all may be divided into two classes: fermented, learened, or raised, and unfermented, unlearened, not raised. The latter is the simplest, and no doubt was the original kind. and is still exemplified by biscuits, the oat cakes of Scotland, the corn bread of America, the dampers of the Australian colonies, and the still ruder bread of savage races. It was probably by accident that the method of bringing the paste into a state of fermentation was found out, by which its toughness is almost entirely destroyed, and it becomes porous, palatable, and digestible. All the cereals are used in making bread, each zone using those which are native to it. Thus maize, millet, and rice are used for the purpose in the hotter countries, rye, barley, and oats in the colder, and wheat in the intermediate or more temperate regions. In the most advanced countries bread is made from wheat, which makes the lightest and most spongy bread. The fermentation necessary for ordinary loaf-bread is generally produced by means of leaven or yeast. Most bakers use the compressed yeast, which is dissolved in scalding water and poured into the "mixer." Enough flour is added to make a thin paste. This is left two or three hours to ferment and then the sponge is ready to be made into dough. Salt is put in the sponge, then milk, lard, and sugar, and finally enough flour to make a good stiff dough. The mixer is a semicylindrical trough about four feet long, in which is a shaft with iron arms running spirally around it, and this becomes a kneading machine, when the dough is made up and the sponger shifts the belt to the tight pulley. The iron arms revolve in the trough, working the dough over and over. The dough is sliced from the arms of the machine as it drags through the mass, thus allowing it to work every particle of dough. From this trough the dough is put into deep wooden troughs, where it is kept covered up for two or three hours. During this time it is carefully watched, and now and then it is "beaten down" by two men, who pass their arms into

### Breadfruit

the dough. The dough is then taken from the trough and thrown on to a bench. One of the benchmen cuts off a batch of dough weighing about fifteen pounds, which is placed in a dividing machine, which forces a number of cutting edges up through the dough, dividing it into twelve equal parts. These are torn apart and tossed on to a bench, where they are quickly kneaded and molded into round loaves. The balls of dough are placed in wooden boxes about 5 ft. long, 3 ft. wide, with sides 4 in. high. A dozen loaves are put in each box, so separated that when they swell up they will not touch each other. These boxes filled are piled up one on the other, and after remaining thus for some time the dough is taken out and worked again, after which the dough is nicely molded into loaves and placed in pans 9 in. long, 41 in. high, and 41 in. wide. In a short time they are placed in the oven. An ordinary baker's oven is about 16 ft. in diameter, and is circular in shape. The bottom of the oven is made of soapstone, and revolves over the fire. The pans containing the dough are placed in the oven by means of a large wooden paddle. The oven will hold about 350 loaves. and requires about a half hour for baking. As soon as the loaves are brought from the oven they are removed from the pans and taken to a cool, dry room, whence they go to the wagons for delivery. Vienna bread is made by a process which differs from the above in some respects. Instead of putting the dough into boxes it is rolled up into long, slim pieces, and each piece is wrapped up in canvas bagging and laid away until ready for the oven. Then the canvas is removed and the loaves are laid directly on the bottom of the oven, and not in pans. Before the loaves are placed in the oven each loaf is washed with a cornstarch preparation. Three slices are made along the top of the loaf with a keen razor. When the loaves are laid on the soapstone the oven is charged with steam, and this, with the cornstarch preparation, gives Vienna bread that peculiar crisp crust. About 250 loaves of bread are made from a barrel of flour, and the average loaf is supposed to weigh about a pound. Aërated bread is so called because made with aërated water, that is, water strongly impregnated with carbonic acid under pressure, the dough being also worked up under pressure and caused to expand by the carbonic acid when the pressure is removed.

Brown or whole-flour bread is considered to be very wholesome. It is made from undressed wheat, and consequently contains the bran as well as the flour.

**Breadfruit**, a large globular fruit of a palegreen color, about the size of a child's head, marked on the surface with irregular six-sided depressions, and containing a white and somewhat fibrous pulp, which when ripe becomes juicy and yellow. The tree that produces it belongs to the order Artocarpaceæ (nearly allied to the Urticaceæ or nettle tribe), and grows wild in Otaheite and other islands of the South Seas, whence it was introduced into the West Indies and S. A. It is about 40 ft. high

# Breakwater

with large and spreading branches, and has large, bright, green leaves deeply divided into seven or nine spear-shaped lobes. The fruit is generally eaten immediately after being gathered, but is also often prepared so as to keep for some time either by baking it whole in close underground pits or by heating it into paste and storing it underground, when a



Breadfruit.

slight fermentation takes place. The eatable part lies between the skin and the core, and is somewhat of the consistence of new bread. Mixed with cocoanut milk it makes an excellent pudding. The inner bark of the tree is made into a kind of cloth. The wood is used for the building of boats and for furniture. The jack much used in India and Ceylon is another member of this genus.

**Bread-nuts**, the seeds of the *Brosimum ali*castrum, a tree of the same order as the breadfruit (which see). The bread-nut tree is anative of Jamaica. Its wood, which resembles mahogany, is useful to cabinetmakers, and its nuts make a pleasant food, in taste not unlike hazelnuts.

Break' water, a work constructed in front of a harbor to serve as a protection against the violence of the waves. The name may also be given to any structure which is erected in the sea with the object of breaking the force of the waves without, and producing a calm within. Breakwaters are usually constructed by sinking loads of unwrought stone along the line where they are to be laid, and allowing them to find their angle of repose under the action of the waves. When the mass rises to the surface, or near it, it is surmounted with a pile of masonry, sloped outwards in such a manner as will best enable it to resist the action of the waves. The great breakwaters are those of Cherbourg in France, Plymouth in England, and Delaware Bay in the U.S. In less im-portant localities floating breakwaters are occasionally used. These are built of strong open woodwork, partly above and partly under water, divided into several sections, and secured by chains attached to fixed bodies. The

breakers lose nearly all their force in passing through the beams of such a structure. A breakwater of this kind may last for twentyfive years.

Breath, the air which issues from the lungs during respiration through the nose and mouth. A smaller portion of oxygen and a larger portion of carbonic acid are contained in the air which is exhaled than in that which is inhaled. There are also aqueous particles in the breath, which are precipitated by the coldness of the external air in the form of visible vapor; likewise other substances which owe their origin to secretions in the mouth, nose, windpipe, and lungs. These cause the changes in the breath which may be known by the smell. A bad breath is often caused by local affections in the nose, the mouth, or the windpipe; viz., by ulcers in the nose, cancerous polypi, by discharges from the mouth, by sores on the lungs, or peculiar secretions in them. It is also caused by decayed teeth, by impurities in the mouth, and by some kinds of food.

**Bréche-de-Roland** (brāsh-dè-rō-län), that is, "the breach of Roland," a mountain pass in the Pyrenees, between France and Spain, which, according to a well-known legend, was opened up by Roland, one of the paladins of Charlemagne, with one blow of his sword Durandal, in order to afford a passage to his army. It is an immense gap in the rocky, mountain barrier 43 mi. to the n. of Huesca.

Breckenridge, WILLIAM C. P., American congressman and orator, b. 1837, at Baltimore, Md. He was graduated from Center College, Ky., in 1855, and two years later was graduated in law from the University of Louisville. He served as colonel of the Ninth Kentucky cavalry in the Confederate army. He was a member of the Forty-ninth, Fiftieth, Fiftyfirst, Fifty-second and Fifty-third Congresses. A breach of promise suit was instituted against him and his political career was practically ended.

Breckenridge, JOHN CABELL (1821-1875), American soldier and statesman. He was the grandson of John Breckenridge, U. S. senator, was educated at Center College. Ky., and prac-tised law in his native town. He served in the war with Mexico as major of a volunteer regiment. On his return he was elected to the Kentucky legislature, and elected to Congress in 1831 and 1853 as a Democrat. In 1856 he became vice-president of the U.S., with Buchanan as president, and in 1860 was nominated for president by the extreme Southern Democrats, who withdrew from the national convention that was held in Charleston, S. C. He received the electoral vote of all the slave states, except Virginia, Kentucky, Tennessee, and Missouri. In 1861 he took his seat in the U. S. Senate as successor to John J. Crittenden, but was expelled Dec. 4, 1861, on account of his political opinions, and went south to enter the Confederate army, in which he was appointed a brigadier general. He was appointed a major general in 1862, and commanded the Confederate reserve at Shiloh. He commanded the right wing of Gen. Braxton Bragg's reserve at Murfreesboro. He served at Chickamauga and Chattanooga; defeated Gen. Franz Sigel at Newmarket, Va.; joined General Lee's army, and served at Cold Harbor; served under Gen. Jubal Early in his advance on Washington, and shared in his defeat by Sheridan near Winchester, Va., September, 1864. From January till April, 1865, he was secretary of war in Jefferson Davis's cabinet, and after the downfall of the Confederacy he went to Europe by way of Cuba. He returned to Kentucky in 1868, where he died.

**Breda** (brā-dā'), a town in Holland, province of North Brabant. Pop. 22,987. Breda was once a strong fortress and of great military importance as a strategical position. From the sixteenth to the end of the eighteenth century Breda has an interesting military history of sieges, assaults, and captures, with which the names of the most famous generals of their time, the Duke of Parma. Maurice of Orange, the Marquis of Spinola, Dumouriez, and Pichegru, etc., are connected. It was the residence for a time of the exiled Charles II of England, and it was in the Declaration of Breda that he promised liberty of conscience, a general amnesty, etc., on his restoration.

The breech is **Breech** (Breech-Loading). the solid mass of metal behind the bore of a gun, and that by which the shock of the explosion is principally sustained. In breechloading arms the charge is introduced here, there being a mechanism by which the breech can be opened and closed. In small arms the advantages of breech-loading for rapidity of fire, facility of cleaning, etc., have recently recommended it to general use, and its efficacy for military purposes was effectively demon-strated by the Prussian campaign against Denmark and Austria in 1864 and 1866. Since that time every government has adopted the new system, both in small arms and heavy ordnance, while breech-loading sporting arms The chief difficulty are also in general use. in breech-loading is to close the breech so as to prevent the escape of the highly elastic gas to which the force of the explosion is due, but the appliances of modern science and mechanical art may be said to have effectually met this difficulty.

Breeding, the art of improving races or breeds of domestic animals, or modifying them in certain directions, by continuous attention to their pairing, in connection with a similar attention to their feeding and general treatment. Animals (and plants no less) show great susceptibility of modification under systematic cultivation; and there can be no doubt that by such cultivation the sum of desirable qualities in particular races has been greatly increased, and that in two ways. Individual specimens are produced possessing more good qualities than can be found in any one specimen of the original stock; and from the same stock many varieties are taken characterized by different perfections, the germs of all of which may have been in the original stock but could not have been simultaneously developed in a single specimen. But when an effort is

made to develop rapidly, or to its extreme limit, any particular quality, it is always made at the expense of some other quality, or of other qualities generally, by which the intrinsic value of the result is necessarily affected. High speed in horses, for example, is only attained at the expense of a sacrifice of strength and power of endurance. So the celebrated merino sheep are the result of a system of breeding which reduces the general size and vigor of the animal, and diminishes the value of the carcass. Much care and judgment, therefore, are needed in breeding, not only in order to produce a particular effect, but also to produce it with the least sacrifice of other qualities.

<sup>A</sup> Breeding, as a means of improving domestic animals, has been practised more or less systematically wherever any attention has been paid to the care of live stock, and nowhere have more satisfactory results been obtained than in Britain. One of the earliest improvers in Britain was Robert Bakewell. of Dishley, in Leicestershire, who commenced his experiments about 1745, and was very successful, especially with sheep, the celebrated Dishley breed of Leicestershire sheep having since maintained a high reputation. Quantity of meat, smallness of bone, lightness of offal; in cows, yield and quality of milk; in sheep, weight of fleece and fineness of wool, have all been studied with remarkable effects by modern breeders.

**Breitenfeld** (bri'tn-felt), a village in Germany, in Saxony, 4 mi. n. of Leipsic, notable as the scene of two battles of the Thirty Years' War, the first gained by Gustavus Adolphus over Tilly and Pappenheim in 1631; the second by the Swedish general Torstenson over the Imperialists commanded by Archduke Leopold and Piccolomini in 1642. It was also the scene of one of the great group of battles between the allies and Napoleon, Oct. 16, 1813.

Bremen (brā'men), a free city of Germany, an independent member of the empire, one of the three Hanse towns, on the Weser, about 50 mi. from its mouth, in its own small territory of 98 sq. mi., besides which it possesses the port of Bremerhaven at the mouth of the Here are the cathedral, founded about river. 1050, the old Gothic council house, with the famous wine cellar below it, the townhall, the merchants' house, and the old and the new ex-change. The manufacturing establishments consist of tobacco and cigar factories, sugar refineries, rice mills, iron foundries, machine works, rope and sail works, and ship-building yards. Its situation renders Bremen the emporium for Hanover, Brunswick, Hesse, and other countries traversed by the Weser, and next to Hamburg it is the principal seat of the export and import and emigration trade of Germany. Pop. 125,684. The principal port is Bremerhaven. Pop. 17.040.

Bremen was made a bishopric by Charlemagne about 788, was afterward made an archbishopric, and by the end of the fourteenth century had become virtually a free imperial city. The constitution is in most respects republican. The legislative authority is shared by a senate of eighteen citizens elected for life, and an assembly of 150 citizens elected for six years. The executive lies with the senate and senatorial committees.

Bremer (brö'mer), FREDERIKA (1802-1865), a Swedish novelist. She wrote an account of her travels; but her fame chiefly rests on her novels, which were translated into German and French, and into English by Mary Howitt. Among the chief of these are Neighbors, The President's Daughters, Nina, and Strife and Peace.

Brenham, Washington co., Texas, near Brazos River, 71 mi. n. of Houston. Railroads: Houston & Texas Central, and Gulf Colorado & Santa Fé. Industries: electric light and oil plant, two iron foundries, furniture, cigar, cotton gin, and farm-implement factories. Surrounding country agricultural. The town was first settled in 1844 and became a city in 1873. Pop. est., 1807, 7,500.

**Brenner**, a mountain in the Tyrolese Alps between Innsbruck and Sterzing; height 6,777 ft. The road from Germany to Italy, traversing this mountain, reaches an elevation of 4,658 ft., and is one of the lowest roads practicable for carriages over the main chain of the Alps. A railway through this route was opened in 1867.

Brennus, the name or title of several princes of the ancient Gauls, of whom the most famous was the leader of the Senones, who invaded the Roman territory about the year 390 B. C. He conquered Etruria from Ravenna to Picenum, besieged Clusium, defeated the Romans near the Allia, sacked Rome, and besieged the capital for six months, but ultimately retired on payment of a large amount of gold. Connected with this invasion are the well-known stories of the massacre of about eighty venerable senators who awaited the Gauls in their chairs of office in the Forum; of the salvation of the capital by the cackling of geese; and of the throwing of the sword of Brennus into the scales when the Romans complained that the weights used by the Gauls were false. According to Polybius the Gauls returned home in safety with their booty; but according to Livy, Brennus was disastrously defeated by Camillus, a distinguished Roman exile who arrived with succor in time to save the capital.

Brent Goose, a wild goose, smaller than the common barnacle goose and of much darker plumage, remarkable for length of wing and extent of migratory power, Leing a winter bird of passage in France, Germany, Holland, Great Britain, the U. S., Canada, etc. It breeds in high northern latitudes; it feeds on drifting seaweeds and saline plants, and is considered the most delicate for the table of all the goose tribe.

Brescia (bra'shi-à), a city of North Italy, capital of the province of the same name. Its public buildings, particularly its churches, are remarkable for the number and value of their frescoes and pictures. Among its chief edifices are the new cathedral, a handsome structure of white marble, begun in 1604, the Rotonda, or old cathedral, the townhall (La Loggia), and the Broletto, or courts. The city contains a museum of antiquities, picturegallery, botanic garden, a fine public library, a theater, hospital, etc. An aqueduct supplies water to its numerous fountains. Near the town are large iron works, and its firearms are esteemed the best that are made in Italy. It has also silk, linen, and paper factories, tan yards, and oil-mills, and is an important mart for raw silk. Brescia was the seat of a school of painting of great merit, including Alessandro, Bonvinco, commonly called "Il Moretto," who flourished in the sixteenth century. The city was originally the chief town of the Cenomanni, and became the seat of a Roman colony under Augustus about B. c. 15. It was burned by the Goths in 412, was again destroyed by Attila, was taken by Charlemagne in 774, and was declared a free city by Otho I of Saxony in 936. In 1426 it put itself under the protection of Venice. In 1796 it was taken by the French, and was assigned to Austria by the Vienna treaty of 1815. In 1849 its streets were barricaded by insurgents, but were carried by the Austrians under General Haynau. It was ceded to Sardinia by the Treaty of Zürich, 1859. Pop. 58,641. The province has an

area of 1,644 sq. mi.; pop. 484,565. Breslau (bres'lou), the third city in the German Empire and the second in the Prussian dominions, being excelled in population only by Berlin and Hamburg, is the capital of the province of Silesia, and is situated on both sides of the Oder. The public squares and buildings are handsome, and the fortifications have been converted into fine promenades. The cathedral, built in the twelfth century, and the Rathhaus, or townhall, a Gothic structure of about the fourteenth century, are among the most remarkable buildings. There is a flourishing university, with a museum, library of 400,000 volumes, observatory, etc. Breslau has manufactures of machinery, railway carriages, furniture and cabinet ware. cigars, spirits and liquors, cotton and woolen yarn, musical instruments, porcelain, glass, etc., and carries on an extensive trade. Breslau was the seat of a bishopric by the year 1000; an independent duchy from 1163 to 1335; then belonged to Bohemia; and was ceded to Austria in 1527. In 1741 it was conquered by Fred-erick II of Prussia. Pop. 335,174.

**Brest**, a seaport in the n.w. of France, dept. of Finisterre. It has one of the best harbors in France, and is the chief station of the French marine, having safe roads capable of containing 500 men-of-war in from 8 to 15 fathoms at low water. The entrance is narrow and rocky, and the coast on both sides is well fortified. The design to make it a naval arsenal originated with Richelieu, and was carried out by Duquesne and Vauban in the reign of Louis XIV, with the result that the town was made almost impregnable. Brest stands on the summit and sides of a projecting ridge, many of the streets being exceedingly steep. Several of the docks have been cut in the solid rock, and a breakwater extends far into the roadstead. The manufactures of Brest are inconsiderable, but it has an extensive trade in cereals, wine, brandy, sardines, mackerel, and colonial goods. It is connected with America by a cable terminating near Duxbury, Mass. The English and Dutch were repulsed at Brest in 1604. In 1794 it was blockaded by Howe, who won a great victory off the coast over the French fleet. Pop. 75,846.

**Brest-Litowski**, a fortified town of Russia, prov. of Grodno, on the Bug, an important railway center, and with a large trade. Pop. 35,424.

Bretigny (brè-tēn-yō), a village of France, dept. Eure-et-Loire. By the treaty of Bretigny (May 8, 1360), between Edward III of England and John II of France, the latter, who had been taken prisoner at Poitiers, recovered his liberty on a ransom of 3,000,000 crowns, while Edward renounced his claim to the crown of France, and relinquished Anjou and Maine, and the greater part of Normandy, in return for Aquitaine, Gascony, Poitou, Saintonge, Périgord, Limousin, etc.

Bretwal'da, a title applied to one of the Anglo-Saxon tribe-chiefs or kings, who it is supposed was from time to time chosen by the other chiefs, nobility, and ealdormen to be a sort of dictator in their wars with the Britons.

**Brevier** (bre-vēr'), a kind of printing type, in size between bourgeois and minion, now called 8 point, the same as the type of this book.

Brewer, DAVID JOSIAH, American jurist; b. 1837; son of an American missionary. He graduated at Yale in 1856, studied law with his uncle, David Dudley Field, graduated at Albany law school in 1858, and practised in Leavenworth, Kan.. where in 1862 he was elected a probate judge, and in 1864 judge of the first judicial district of Kansas. In 1870 he became associate justice of the State Supreme Court, was reflected in 1876 and again in 1882, and resigned in 1884, to become U. S. circuitjudge for the eighth circuit. President Harrison nominated him associate justice of the U. S. Supreme Court in 1889 in succession to Stanley Matthews.

Brewing, the process of extracting a saccharine solution from malted grain and con-verting the solution into a fermented and sound alcoholic beverage called ale or beer. The preliminary process of malting (often a distinct business to that of brewing) consists in promoting the germination of the grain for the sake of the saccharine matter into which the starch of the seed is thus converted. The barley or other grain is steeped for about two days in a cistern and then piled in a heap, or couch, which is turned and re-turned until the radicle or root, and acrospire or rudimentary stem, have uniformly developed to some little extent in all the heap of grain. This treatment lasts from seven to ten days, by which time the grain has acquired a sweet taste; the

life of the grain being then destroyed by spreading the whole upon the floor of a kiln to be thoroughly dried. At this point begins the brewing process proper, which in breweries is generally as follows: The malt is crushed or roughly ground in a malt-mill, whence it is carried to the mashing-machine, and there thoroughly mixed with hot water. The mixture is now received by the mash-tun-a cylindrical vessel with a false perforated bottom held about an inch from the true one. In the mash-tun the useful elements are extracted from the malt in the form of the sweet liquor known as wort, and the tun, therefore, is fitted with an elaborate system of revolving rakes for thoroughly mixing the malt with hot The mixing completed, the mash-tun water. is covered up and allowed to stand for about three hours, when the taps in the true bottom are opened and the wort or malt-extract run off. The wort being drained into a copper the hops are now added, and the whole boiled for about two hours, the boiling, like the addition of hops, tending to prevent acetous and putrefactive fermentation. When sufficiently boiled the contents of the copper are run into the hop-back-a long, rectangular vessel with a false bottom 8 or 9 in. from the true bottom. The hot wort leaving the spent hops in the hop-back runs through the perforations in the false bottom and thence into the cooler-a large flat vessel where the worts are cooled to about 100° F. From the cooler the liquor is admitted to the refrigerator-a shallow rectangular vessel, which reduces the temperature to almost that of the cold water, or about 58°. The worts are next led by pipes into the large wooden fermenting tuns, where yeast or barm is added as soon as the wort begins to run in from the refrigerator. During the operation of fermentation, by which a portion of the saccharine matter is converted into alcohol, the temperature rises considerably, and requires to be kept in check by means of a coil of copper piping with cold water running through it lowered into the beer. When the fermentation has gone far enough, and the liquor has been allowed to settle, the beer be-comes comparatively clear and bright, and may be run off and filled into the trade casks or into vats.

The various beers manufactured from grain have sometimes been classified under the three heads of beer, ale, and porter ; but at the present day this classification will not hold, as beer, though it occasionally may have a specific meaning, is often used as the general name for all malt liquors. Both terms belong to the early or Anglo-Saxon period of the English language but in more modern times the term beer seems to have been applied more especially to malt liquor flavored with hops, wormwood, or other bitters. Ale was originally made from barley malt and yeast alone, and the use of hops was first introduced in Germany, which is still a great brewing country. One of the kinds of German beer now widely known and consumed is lager beer - that is, store beer, the name being given to it because it is usually kept for four to six months before being used. In brewing it the fermentation is made to go on rather slowly and at a low temperature. Much lager beer is now made in the U.S., the largest breweries in the world are located at Milwaukee, Wis., and at St. Louis, Mo.

The manufacture of ale or beer is of very high antiquity. Herodotus ascribes the invention of brewing to Isis, and it was certainly practised in Egypt. Xenophon mentions it as being used in Armenia, and the Gauls were early acquainted with it. Pliny mentions an intoxicating liquor made of corn and water as common to all the nations of the west of Europe, and in England ale-booths were regulated by law as early as the eighth century. A rude process of brewing is carried on by many uncivilized races; thus chica or maize beer is made by the South American Indians, millet beer by various African tribes, etc.

Brew'ster, SIR DAVID (1781-1868), one of the greatest physicists of this century; was attracted by the lectures of Robson and Playfair to science. In 1807 he became M.A. of Cambridge, LL.D. of Aberdeen, and member of the Royal Society of Edinburgh. In 1808 he became editor of the Edinburgh Encyclopædia and in 1819, in conjunction with Jameson, founded the Edinburgh Philosophical Journal, of which he was sole editor from 1824-32. Brewster was one of the founders of the British Association, and its president in 1850. In 1832 he was knighted and pensioned. From 1838 to 1859 he was principal of the united colleges of St. Leonard's and St. Salvador at St. Andrews and in the latter year was chosen principal of the University of Edinburgh. Among his inventions were the "polyzonal lens," the kaleidoscope, and the improved stereoscope. His chief works are a Treatise on the Kaleidoscope, Letters on Natural Magic, etc.

**Brewster**, WILLIAM (1566-1664), the leader of the *Mayflower* Pilgrims, was born at Scrooby, and educated at Cambridge. He left the Established Church, and founded a separate society in his house. In 1608 he went to Holland, and opened a school at Leyden. He was made ruling elder, and conducted the Pilgrims in the *Mayflower* to Plymouth, Mass., in 1620. B. was their only spiritual teacher for some years, but he did not administer the sacraments. He is venerated as the ruling spirit in the earliest New England colony.

Bri'an, a famous chieftain of the early 1rish annals, who succeeded to Munster in 978, defeated the Danes of Limerick and Waterford, attacked Malachi, nominal king of the whole island, and became king in his stead (1002). He was slain at the close of the battle of Clontarf, near Dublin, in 1014, after gaining a signal victory over the revolted Maelmora and his Danish allies.

**Briançon** (brē-ån-sön), a town and fortress of France, department of Hautes Alpes, on the right bank of the Durance. It occupies an eminence 4,284 ft. above sea level, and has been called the Gibraltar of the Alps. Pop. 6,850.

Brick, a sort of artificial stone, made principally of argillaceous earth formed in molds, dried in the sun, and baked by burning, or, as in many eastern countries, by exposure to the sun. Sun-dried bricks of great antiquity have been found in Egypt, Assyria, and Babylonia, and in the mud walls of old Indian towns. Under the Romans the art of making and building with bricks was brought to great perfection, and the impressions on Roman bricks, like those on the bricks of Babylonia, have been of considerable historic value. In fact the chief source of knowledge of the ancients lies in the inscriptions of this kind. The Roman brick was afterward supersoded in England by the smaller Flemish make. Of the various clays used in brickmaking, the simplest, consisting chiefly of silicates of alumina, are almost infusible, and are known as fire-clays, the Stourbridge clay being specially famous. Of such clays fire-bricks are made. Clays containing lime and no iron burn white, the colors of others being due to the presence in varying proportions of ferric oxide, which also adds to the hardness of bricks. The clay should be dug in autumn and exposed to the influence of frost and rain. It should be worked over repeatedly with the spade and tempered to a ductile, homogeneous paste, and should not be made into bricks until the ensuing spring. The making of bricks by hand in molds is a simple process. After being made and dried for about nine or ten days they are ready for the burning, for which purpose they are formed into kilns, having flues or cavities at the bottom for the insertion of the fuel, and interstices between them for the fire and hot air to penetrate. Much care is necessary in regulating the fire, since too much heat vitrifies the bricks and too little leaves them soft and friable. Bricks are now largely made by machines of various constructions. In one the clay is mixed and comminuted in a cylindrical pugmill by means of rotatory knives or cutters working spirally and pressing the clay down to the bottom of the cylinder. From this it is conveyed by rollers and forced through an opening of the required size in a solid rect-angular stream, which is cut into bricks by wires working transversely. Machine-made bricks are heavier, being less porous than hand-made bricks, and are more liable to crack in drying; but they are smoother, and, when carefully dried, stronger than the hand-made.

**Bricklaying.**—In many countries the only available material for house-building is brick. The solidity and durability of a brick building depends largely upon the manner in which the brick are laid. In laying the foundations of walls, the first courses should be thicker than the intended superstructure, and the projections thus formed, usually of quarter brick on each side, are called "set-offs." Mortar composed of lime and sand is the common cement for brick-work. It should be equally and carefully applied. The most important thing in bricklaying is to see that the wall is properly bonded. The bricks of every course should cover the joints of the course below it, or, to use the bricklayer's phrase, the work must "break bond." A layer or stratum of bricks is called a course. Bricks laid with their lengths in the direction of the course, and their sides to the wall face, are called stretchers; those laid transversely, with their ends forming the wall face, headers; a layer of headers, a heading course; of stretchers, a stretching course.

The two kinds of bond almost exclusively used consist of alternate stretching and heading courses; and of a stretcher and header laid alternately in each course. The first bond is the strongest, but the second bond is the more ornamental; and they are used accordingly. There are two other kinds of bond occasionally used for thick walls. In both the center of the wall is filled up with bricks laid diagonally, by what is called in the one case raking courses, and in the other herring-bone work. In order to strengthen the bond, bands of hoopiron, tarred and sanded, are sometimes laid This "hoopflat-wise between the courses. iron bond" has superseded the old practise of using bond-timbers. Walls of brick are frequently built hollow, and these dry quicker and perhaps more thoroughly than those built solid. In such walls there is a thin outer and inner face of brick with hollow spaces between. Different ways are adopted for bonding or tying these walls. Hollow bricks are also used for walls, partitions, floor arches, and other work. Neat pointing of the joints often gives a very pretty appearance to brick-work.

Bricks of the ordinary rectangular shape are often used for arches, leaving the gaping interstices at the upper ends to be filled with mortar or chips of brick. Such an arch cannot be strong. As the joints radiate to a center, the arch bricks should be made of or cut to the proper form, just as arch stones are cut to the right shape. In all kinds of bricklaying the walls should be built up level throughout, in order that the settlement may be equal.

Bridge, a structure of stone, brick, wood, or iron, affording a passage over a stream, valley, or the like. The earliest bridges were no doubt trunks of trees. The arch seems to have been unknown among most of the nations of an-tiquity. Even the Greeks had not sufficient acquaintance with it to apply it to bridge building. The Romans were the first to employ the principle of the arch in this direction, and after the construction of such a work as the great arched sewer at Rome, the Cioaca Maxima, a bridge over the Tiber would be of comparatively easy execution. One of the finest examples of the Roman bridge was the bridge built by Augustus over the Nera at Narni, the vestiges of which still remain. It consisted of four arches, the longest of 142 ft. span. The most celebrated bridges of ancient Rome were not generally, however, distinguished by the extraordinary size of their arches, nor by the lightness of their piers, but by their excellence and durability. The span of their arches seldom exceeded 70 or 80 ft., and they were mostly semicircular, or nearly so. The Romans built bridges wherever their conquests extended, and in Britain there are still a number of bridges dating from Roman times. One of the

most ancient post-Roman bridges in England is the Gothic triangular bridge at Croyland, in Lincolnshire, said to have been built in 860. having three archways meeting in a common center at their apex, and three roadways. The longest old bridge in England was that over the Trent at Burton, in Staffordshire, built in the twelfth century, of squared free-stone, and recently pulled down. It consisted of thirtysix arches, and was 1,545 ft. long. Old London Bridge was commenced in 1176, and finished in 1209. It had houses on each side like a regular street till 1756-58. In 1831 it was altogether removed, the new bridge, which had been begun in 1824, having then been finished. The art of bridge building made no progress after the destruction of the Roman Empire till the eighteenth century, when the French architects began to introduce improvements, and the constructions of Perronet (Nogent-sur-Seine; Neuilly; Louis XVI bridge at Paris) are master-Within the last half century or so the pieces. use of steam and iron, the immense development of all mechanical contrivances, and the great demand for railway bridges and viaducts have given a great.stimulus to invention in this department.

Stone bridges consist of an arch or series of arches, and in building them the properties of the arch, the nature of the materials, and many other matters have to be carefully considered. It has been found that in the construction of an arch the slipping of the stones upon one another is prevented by their mutual pressure and the friction of their surfaces; the use of cement is thus subordinate to the principle of construction in contributing to the strength and maintenance of the fabric. The masonry or rock which receives the lateral thrust of an arch is called the *abutment*, the perpendicular supports are the *piers*. The width of an arch is its span; the greatest span in any stone bridge is about 250 feet. A one-span bridge has, of course, no piers. In constructing a bridge across a deep stream it is desirable to have the smallest possible number of points of support. Piers in the waterway are not only expensive to form, but obstruct the navigation of the river, and by the very extent of resisting surface they expose the structure to shocks and the wearing action of the water. In building an arch, a timber framework is used called the center or centering. The centering has to keep the stones or roussoirs in position till they are keyed in, that is, all fixed in their places by the insertion of the keystone.

The first iron bridges were erected from about 1777 to 1700. The same general principles apply to the construction of iron as of stone bridges, but the greater cohesion and adaptability of the material give more liberty to the architect, and much greater width of span is possible. At first iron bridges were erected in the form of arches, and the material employed was cast iron; but the arch has now been generally superseded by the beam or girder, with its numerous modifications; and wrought-iron or steel is likewise found to be much better adapted for resisting a great

tensile strain than cast-metal. Numerous modifications exist of the beam or girder, as the lattice girder, bowstring girder, etc.; but of these none is more interesting than the tubular or hollow girder, first rendered famous from its employment by Robert Stephenson in the construction of the railway bridge across the Meneai Strait, and connecting Anglesey with the main land of North Wales. This is known the main land of North Wales. as the Britannia tubular bridge. The tubes are of a rectangular form, and constructed of riveted plates of wrought-iron, with rows of rectangular tubes or cells for the floor and roof respectively. The bridge consists of two of these enormous tubes or hollow beams laid side by side, one for the up and the other for the down traffic of the railway, and extending each to about a quarter of a mile in length. Other tubular bridges of importance are the Conway Bridge, over the River Conway, an erection identical in principle with the Britannia Bridge, but on a smaller scale; the Brotherton Bridge over the River Aire; the tubular railway bridge across the Damietta branch of the Nile, which has this peculiarity, that the roadway is carried above instead of through the tubes; and the Victoria Bridge over the St. Lawrence, Canada. A girder railway bridge across the Firth of Tay at Dundee was opened in 1887, being the second built at the same place, after the first had given away in a great storm. It is 2 mi. 73 yds. long, has 85 spans. is 77 ft. high and carries two lines of rails. The bridge over the Firth of Forth, at Queensferry, in course of construction, has two chief spans of 1,710 ft., two others of 680 ft., fifteen of 168 ft., and seven small arches, and will give a clear headway for navigation purposes of 150 ft. above high-water of springtides. The great spans consist of a canti-lever at either end, 680 ft. long, and a central girder of 350 ft. Both the above bridges are built to carry the lines of the North British Railway. The Crumlin Railway viaduct. South Wales, having lattice-girders supported on open-work piers is more remarkable for height than length, being 200 ft. high.

Suspension bridges, being entirely independent of central supports, do not interfere with the river, and may be erected where it is impracticable to build bridges of any other kind. The entire weight of a suspension bridge rests upon the piers at either end from which it is points of support. Such bridges always swing a little, giving a vibratory movement which imparts a peculiar sensation to the passenger. The modes of constructing these bridges are various. The roadway is suspended either from chains or from wire-ropes, the ends of which require to be anchored, that is, attached to the solid rock or masses of masonry or iron. One of the earlier of the great suspension bridges is that constructed by Telford over the Menai Strait, near the Britannia Tubular Bridge, finished in 1825; the opening between the points of suspension is 580 ft. On the European continent, the Fribourg Suspension bridge in Switzerland, span 870 ft., erected

1834, is a celebrated work; as is that over the Danube connecting Buda with Pesth. In America the lower suspension bridge over the Niagara, 7 mi. below the falls, sup-ported by wire cables, is 822 ft. long; it has two floors or roadways connected together but 15 ft. apart, the lower serving for ordinary traffic, the upper carrying three lines of rails, 245 ft. above the river. Another bridge, close to the falls, has a span of 1,250 ft. The Cincinnati bridge over the Ohio has a span of 1,057 ft. A suspension bridge of great magnitude, connecting the city of New York with Brook-lyn, was opened in 1883. The central or main span is 1,595; ft. from tower to tower, and the land spans between the towers and the anchorages 930 ft. each; the approach on the New York side is 2,492 ft. long, and that on the Brooklyn side 1,901 ft., making the total length 5,989 ft. The height of the platform at the center is 135 ft. above high-water, and at the ends 119 ft. The roadway is 85 ft. broad, and is divided into five sections, the two outside for vehicles, the two inner for tram-cars, and the middle one, 12 ft. above the rest, for foot passengers.

Though the oldest bridges on record were built of wood, like the Sublician Bridge at Rome, or that thrown by Cæsar across the Rhine, it is only in certain places and for certain purposes that wood is much used at present. Perhaps the most celebrated of all wooden bridges was that which spanned the Rhine at Schaffhausen in Switzerland. This was 364 ft. in length and 18 ft. broad. It was designed and executed by Ulric Grubenman, a village carpenter, in 1758, and was destroyed by the French in 1799. In the U.S., where timber is still in common use, we have some fine ex-amples, the Trenton Bridge over the Delaware, erected in 1804; the bridge over the Susquehanna, etc. Some of the most notable developments in the art of bridge construction are to be found on this continent, where an enormous railway system traversing a country of great rivers and ravines, has given an exceptional stimulus to the art. The main characteristics of American bridges are simplicity and boldness of design, the reduction of the number of members to a minimum by the use of open trusses composed of simple systems rather than the plate, tubular, or closely latticed girders of European engineers, thus offering less resistance to wind pressure.

The largest swing bridge in the world is now in process of construction on the Chicago Drainage Canal. Over this bridge there will be eight railroad tracks. The bridge will be of steel construction, weighing 7.000,000 pounds, and capable of supporting a train-load of 8.800,-000 pounds. The total cost is estimated at \$700,000. This bridge will have a total length of 400 ft. 5 in., and width 125 ft. The height of the center columns will be 68 ft., and the headway under the trusses for trains 21 ft., headway under the bridge 18 ft., and depth of water in the channel 24 ft. Electric power will be used to turn the bridge. The turntable will have a diameter of 80 ft. and will be 10 ft. below the level of the bridge. This bridge will be used by the Northern Pacific, the Pan Handle, and Union Stock Yards Railroads.

Bridge port, a seaport of Connecticut, 58 mi. n.e. of New York, on an arm of Long Island Sound, with a large coasting trade, but chiefly supported by its manufactures, including the large sewing-machine factories of Wheeler, Wilson & Co., Elias Howe, etc. Pop. est. 1897, 50,000.

Bridgeton, Cumberland co., N. J., on the Cohansey Creek. Railroads: Vineland, West Jersey, and Bridgeton & Port Norris. It is the location of the West Jersey Academy, South Jersey Institute, and Ivy Hall, a school for girls. Industries: rolling mill, glass works. nail factory, woolen mills, leather factories, machinery works and carriage factory. Pop. est. 1897, 14,000.

**Bridgetown,** the capital of the island of Barbadoes, in the West Indies, extending along the shore of Carlisle Bay, on the s.w. coast of the island for nearly 2 mi. Its appearance is very pleasing, the houses being embosomed in trees, while hills of moderate height rise behind, studded with villas. Bridgetown is the residence of the governor general of the Windward Islands. Pop. 20,047.

Bridge' water (or Bridgwater), a municipal borough and port in the county of Somerset, England, on the Parret, which is navigable as far up as the town for small vessels. A considerable shipping trade is carried on, chiefly coastwise. Bricks are made here in great quantities, especially bath bricks. Up till 1870, when it was disfranchised for bribery. Bridgewater returned two members to Parliament. Pop. 12,429.

Bridgman, LAURA DEWEY (1829-1889), a remarkable blind and deaf mute. At the age of two a severe illness deprived her of sight. hearing, and speech, and to some extent also of smell and taste. She was placed in the Perkins institution for the blind, Boston, at the age of eight, and Dr. Howe undertook her education. The first step was made by giving her some familiar object, with its name in raised letters, and teaching her at the same time the qualities of that article and its relation to other things. She made rapid progress, and acquired a knowledge of geography. arithmetic, learned to do household work and also to sew, both by hand and on the machine. After receiving her education, Miss Bridgman taught in the Perkins institution. She was a member of the Baptist Church. She read whatever book she found in raised print, especially the Bible. She made much of her own clothing.

Bridle and Bit, that part of a horse's harness which is attached to the head and mouth, by means of which he is governed and restrained. The proper bitting of horses has been a matter of much study, and innumerable kinds of bits have been introduced for the purpose. The ordinary single riding-bridle has a snaffle-bit. There are several forms of the snaffle-bit. The common riding form is a

round, smooth bit, jointed in the middle, attached at either side to straight bars or cheeks, which prevent the bit being pulled through the horse's mouth, and with rings to which the reins and cheek-pieces of the headstall are fixed. The twisted snaffle has the mouthpiece twisted or fluted. The ring snaffle is



Bridle and Bit.

made without cheeks; and the rings for headstall and reins are not fixed, but work loose in holes at the ends of the mouthpiece. The double bridle is generally used in the hunting field and often for ordinary purposes. Among the Arabs and in South America and some parts of Mexico and Texas, a heavy, old-fashioned, and terribly cruel curb-bit is used. On the other hand, the stockmen of Australia employ the plain snaffle-bridle alone. It is interesting to know that in the representations of harnessed horses in the Assyrian sculptures the bridle generally shown is apparently almost identical with the modern snaffle. The figure represents a chariot horse with bridle, and a bronze bit from Nimrud.

**Briel** (brēl) (or Brielle, brē-el'), sometimes called the *Briel*, a fortified seaport of Holland, near the mouth of the Mass, province of South Holland. The taking of Briel in 1572 was the first success of the revolted Netherlanders in their struggle with Philip II of Spain. The famous Admiral Van Tromp was born here. Pop. 4,442.

**Brienne** (brē-ān), a small town of France, dep. Aube. In the military academy which formerly existed here Napoleon received his early military training. Brienne was also the scene of a bloody battle between Blücher and Napoleon (Feb. 29, 1814).

**Brig**, a sailing vessel with two masts rigged like the foremast and mizzen-mast of a fullrigged ship. See *Brigantine*.

Brig'antine, a sailing vessel with two masts, the foremast rigged like a brig's, the mainmast rigged like a schooner's. Called also hermophrodite brig.

Briggs, CHARLES AUGUSTUS, a Presbyterian theologian, b. in New York, Jan. 15, 1841. He studied at Union Theological Seminary, New York City, and at the University of Berlin, Germany. In 1874 he became professor of Hebrew and the cognate languages in Union Theological Seminary. He was made a member of the editorial staff of the Presbyterian Review in 1880. His works include Biblical Study, American Presbyterianism, Messianic Prophecy, etc. His advanced views in biblical criticism, with certain doctrinal views, subjected him to a trial for heresy 1892-93, which resulted in his condemnation and suspension by the Presbyterian General Assembly.

**Briggs**, HENRY (1556-1631), a celebrated English mathematician. He was the first Savilian professor of geometry at Oxford. In 1616 he visited Napier, the inventor of logarithms, and afterward published his work on logarithms, which suggested an important improvement upon Napier's system.

provement upon Napier's system. Bright, JOHN (1811-1889), English orator and He first became known as a leadstatesman. ing spirit in the Anti-corn-law League. In 1843 he was chosen M. P. for Durham, and distinguished himself as a strenuous advocate of free-trade and reform. In 1847 he sat for the first time for Manchester, but in 1857 his opposition to the war with China made him so unpopular in the constituency that he lost his seat by a large majority. He was, however, returned for Birmingham, and soon after made speeches against the policy of great military establishments and wars of annexation. During the American Civil War he was one of the few English statesmen who were outspokenly in favor of the Union cause. In 1865 he took a leading part in the movement for the extension of the franchise, and strongly advocated the necessity of reform in Ireland. In the Gladstone ministry formed in 1868, he was president of the board of trade and afterward chancellor of the duchy of Lancaster, and he held the latter office again under Mr. Glad-stone in 1880-1882. In 1886 he joined the Liberals who opposed Mr. Gladstone's schemes for Ireland, and contributed by his letters and in-



fluence to the overthrow of the Gladstone party. He was a member of the Society of Friends.

**Brighton** (brī'tun), a maritime town and watering-place in England, co. of Sussex,  $50\frac{1}{4}$ mi. from London. In front of the town is a massive sea wall, with a promenade and drive over 3 mi. in length, one of the finest in Europe.
Brighton has no manufactures, and is resorted to only as a watering-place. It was about the middle of last century that Dr. Russell, an eminent physician, drew attention to Brighton, which subsequently was patronized by George IV, then Prince of Wales. Pop. 142,121.

Bright's Disease, a name (derived from Dr. Richard Bright (1789-1856), an English physician, who first described the disorder) given to various forms of kidney disease, especially to that which is characterized by a granular condition of the cortical part of the kidneys and inflammation of the malpighian bodies. The urine during life contains albumen, and is of less specific gravity than natural. The disease is accompanied with uneasiness or pain in the loins, pale or cachectic countenance, disordered digestion, frequent urination, and dropsy. The blood contains urea, and is deficient in albu-men and corpuscles. Progressive blood poisoning induces other visceral diseases, and in the end gives rise to the cerebral disturbance which is the frequent cause of death.

**Brillat-Savarin** (brè-yä-så-và-ran) (1775– 1820), a French author, who, although he wrote works on political economy, archeeology, and duelling, is now known only by his famous book on gastronomy, the *Physiologie du Gout*, published in 1823.

Brim'stone, a name of sulphur. Sulphur, in order to purify it from foreign matters, is generally melted in a close vessel, allowed to settle, then poured into cylindrical molds, in which it becomes hard, and is known in commerce as *roll brimstone*.

**Brindaban** (brin-dä-ban'), a town of India, one of the holiest cities of the Hindus, with a large number of temples, shrines, and sacred sites. Pop. 21,467.

**Brindisi** (brên'di-sẽ, anc. Brundusium), a seaport and fortified town, province of Lecce, Southern Italy, on the Adriatic, 45 mi. e.n.e. of Taranto. In ancient times Brundusium was an important city, and with its excellent port became a considerable naval station of the Romans. Its importance as a seaport declined in the Middle Ages, and was subsequently completely lost, and its harbor blocked, until in 1870 the Peninsular and Oriental Steam Navigation Company put on a weekly line of steamers between Brindisi and Alexandria for the conveyance of mails and passengers between Europe and the East. From this cause Brindisi has suddenly risen into importance. Pop. 16,719.

**Brind'ley**, JAMES (1716-1772), an English engineer and mechanic. When the Duke of Bridgewater was occupied in planning a communication between his estate at Worsley and the towns of Manchester and Liverpool by water, Brindley undertook the work, and by means of aqueducts over valleys, rivers, etc., he completed the Bridgewater Canal between 1758 and 1761, so as to form a junction with the Mersey. The other great works of this kind undertaken by him were the Grand Trunk Canal uniting the Trent and Mersey, and a canal uniting that with the Severn.

Brignoli, PASQUALE (1824-1884), b. in Italy,

d. in New York City. He came to the U.S. in 1855, and for nearly thirty years his magnificent tenor voice was heard in opera and concert music in this country and in Europe.

Brinvilliers (bran-vēl-yā), MARIE MARQUE-RITE D' AUBRAY, MARCHONESS OF (1630-1676), a notorious French poisoner. She was married in 1651 to the Marquis of Brinvilliers. but after some seven or eight years of married life a young cavalry officer named Sainte-Croix inspired her with a violent passion, and being instructed by him in the art of preparing poisons, she poisoned in succession her father, her two brothers, and her sisters, chiefly, it is thought, in order to procure the means for living extravagantly with her paramour. The sudden death of Sainte-Croix led to the discovery of letters incriminating Madame de Brinvilliers. She fied to Liége, where she was captured, conveyed to Paris, and condemned to death.

Bris' bane, the capital of Queensland, about 25 miles by water from the mouth of the river Brisbane, which intersects the town. Brisbane was originally settled, in 1825, as a penal sta-tion by Sir Thomas Brisbane (whence the name of the town). In 1842 the district was opened to free settlers, and on the erection of Queensland into a separate colony in 1859, Brisbane become the capital. Since then it has made great progress, and now possesses many fine public buildings, such as the Houses of Legislature, erected at a cost of over \$500-000, the townhall and the Albert Hall, the viceregal lodge, the post and telegraph offices. etc. There are also botanical gardens, several public parks, etc. The climate is tropical, the annual rainfall about 55 inches. The town is the terminus of the western and southern railway system, and the port is the principal one in the colony. Pop. 50,000.

Bris bane, GENERAL SIR THOMAS MAC-DOUGALL (1773-1860), a Scotch soldier and astronomer. After serving in Flanders and the West Indies he commanded a brigade under the Duke of Wellington during the Peninsular war, and took part in the battles of Vittoria, Orthes, and Toulouse. In 1821 he was appointed governor of New South Wales. At the same time he devoted himself to astronomy, and from his observatory at Paramatta catalogued 7,385 stars, until then scarcely known. On his return to Scotland he continued his astronomical pursuits, until his death.

Bristies, the stiff, coarse, glossy hairs of the hog and the wild boar, especially of the hair growing on the back; extensively used by brushmakers, shoemakers, saddlers, etc., and chiefly imported from Russia and Germany. Russia supplies the finest qualities, which are worth about \$250 or \$300 per cwt.

Bris'tol, a cathedral city of England, situated partly in Gloucestershire, partly in Somersetshire, but forming a county in itself. The town is built partly on low grounds, partly on eminences, and has some fine suburban districts, such as Clifton, on the opposite side of the Avon, and connected with

Bristol by a suspension bridge 703 ft. long and 245 ft. above high-water mark. The most notable public buildings are the cathedral, founded in 1142; St. Mary Redcliff, said to have been founded in 1293, and perhaps the finest parish church in the kingdom. Bristol has glass works, potteries, soap works, tanneries, sugar refineries, and chemical works, shipbuilding and machinery yards. Coal is worked extensively within the limits of the borough. The export and import trade is large and varied. There is a harbor in the city itself, and the construction of new docks at Avonmouth and Portishead has given a fresh impetus to the port. The Saxons called it *Bricgstow*, "bridge-place." In 1373 it was constituted a county of itself by Edward III. It was made the seat of a bishopric by Henry VIII in 1542 (now united with Gloucester). In 1831 the reform agitation gave origin to riots that lasted for several days. The rioters destroyed a number of public and private buildings, and had to be dispersed by the military. Sebastian Cabot, Chatterton, and Southey were natives of Bristol. Pop. 221,-655

**Bristol**, Bristol co., R. I., 15 mi. s.e. of Providence, on Narragansett Bay. Railroad: Old Col. R. R. It is the seat of worsted mills, cotton mills, shipyards and a rubber goods factory whose product is valued at \$2,000,000 per annum. Pop. est. 1897, 5,600.

Bristol, Hartford co., Conn. Railroad: N. Y. & N. E. Industries: clock, stocking and water wheel manufactories, also several foundries and machine shops. Copper is found near there. Pop. est. 1897, 7,800. Bristol, Bucks co., Pa., on Delaware River,

Bristol, Bucks co., Pa., on Delaware River, 17 mi. e. of Philadelphia. Railroad: Pennsylvania. Industries: iron foundry, carpet, worsted yarn, hosiery, cassimere, and other factories, and planing mill. Surrounding country agricultural. It was first settled in 1681, laid out in 1695, incorporated a borough by letters patent from the crown in 1720. Pop. est. 1897, 7,000. Bristol Channel, an arm of the Atlantic,

Bristol Channel, an arm of the Atlantic, extending between the southern shores of Wales and the southwestern peninsula of England, and forming the continuation of the estuary of the Severn. It is remarkable for its high tides.

high tides. Britannia Tubular Bridge, an iron tubular bridge across Menai Strait, which separates Anglesea from Wales, about one mi. from the Menai Suspension Bridge. It has two principal spans of 460 ft. each over the water, and two smaller ones of 230 ft. each over the land; constructed 1846-50.

Britan' nicus, son of the Roman Emperor Claudius, by Messalina, b. A. D. 42, poisoned A. D. 56. He was passed over by his father for the son of his new wife Agrippina. This son became the Emperor Nero, whose fears that he might be displaced by the natural successor of the late emperor caused him to murder Britannicus.

British Association FOR THE ADVANCEMENT OF SCIENCE, a society first organized in 1831,

mainly through the exertions of Sir David Brewster, whose object is to assist the progress of discovery and to disseminate the latest results of scientific research, by bringing together men eminent in all the several departments of science. Its first meeting was held at York on Sept. 26, 1831, under the presidency of Lord Milton; and all the principal towns of the United Kingdom have on different occasions formed the place of rendezvous, a different locality being chosen every year. The seances extend generally over about a week. The society is divided into sections, which, after the president's address, meet separately during the seances for the reading of papers and conference. Soirees, conversaziones, lectures, and other general meetings are usually held each evening during the meeting of the association. As the funds which the society collects at each meeting are more than sufficient to cover its expenses, it is enabled to make money grants for the pursuit of particular scientific inquiries, which otherwise could not be conducted so efficiently, if at all. In 1884 the association held its meeting in Montreal, Canada, the only occasion on which it has met out of the United Kingdom. British Columbia, a British colony forming

with Vancouver Island a province of the Dominion of Canada. Area 341,305 sq. mi. (including Vancouver Island). Till 1858 it was part of the Hudson Bay Territory; in that year gold discoveries brought settlers, and it became a colony. Vancouver Island, 16,000 sq. mi., became a colony at the same time, but was afterward joined to British Columbia; the conjoined colony entered the Dominion in 1871. The coast line is much indented, and is flanked by numerous islands, the Queen Charlotte Islands being the chief after Vancouver. The interior is mountainous, being traversed by the Cascade Mountains near the coast, and by the Rocky Mountains farther west. There are numerous lakes, generally long and narrow, and lying in the deep ravines that form a feature of the surface and are traversed by numerous rivers. Of these the Fraser, with its tributary the Thomson, belongs entirely to the colony, as does also the Skeena; while the upper courses of the Peace River and of the Columbia also belong to it. All except the Peace find their way to the Pacific. Its mountain ranges (highest summits; Mount Hooker, 15,700 feet, and Mount Brown, 16,000 feet) afford magnificent timber (including the Douglas pine and many other trees); and between the ranges are wide grassy prairies. Part of the interior is so dry in summer as to render irrigation necessary, and the arable land is comparatively limited in area, but there is a vast extent of splendid pasture land. The climate is mild in the lower valleys, but severe in the higher levels; it is very healthy. The chief products of the colony are gold. coal, silver, iron, copper, galena, mercury, and other metals; timber, furs, and fish, the last, particularly salmon, being very abundant in the streams and on the coasts. Gold exists almost everywhere, but has been obtained

chiefly in the Cariboo district. The total yield since 1858 has been over \$50,000,000. The coal is found chiefly in Vancouver Island, and is mined at Nanaimo, where large quantities are now raised. Mining, cattle-rearing, agriculture, fruit-growing, salmon-canning, and lum-bering are the chief industries. Victoria, on bering are the chief industries. the s.e. coast of Vancouver Island, is the capi-tal and chief town of the colony. New Westminster, on the Fraser River, about 15 mi. from its mouth, is the most considerable place on the mainland; but the new town Van-couver, the terminus of the Canadian Pacific railway, at the mouth of the Fraser, will doubtless become a place of importance. Besides this railway there is one between Nan-aimo and Victoria. Steamers now run to aimo and Victoria. Steamers now run to China and Japan in connection with the Cana-dian Pacific Railway, also lines to Australia and India are open. Like the other provinces of the Dominion, British Columbia has a separate parliament and administration, with a lieutenant governor of its own. Schools are supported entirely by government. Pop. including about 25,000 Indians, in 1891, 92,767.

British Museum, the great national museum in London, owes its foundation to Sir Hans Sloane, who, in 1753, bequeathed his various collections, including 50,000 books and MSS., to the nation, on the condition of \$100,000-less by \$150,000 than the original cost-being paid to his heirs. Montague House, which was bought for the purpose for \$51,250, was ap-propriated for the museum, which was first opened on Jan. 15, 1759. The original to his heirs. edifice having become inadequate, a new build-ing in Great Russell Street was resolved upon in 1823, the architect being Sir R. Smirke, whose building was not completed till 1847. In 1857 a new library building was completed and opened at a cost of \$750,000. It contains a circular reading-room 140 ft. in diameter, with a dome 106 ft. in height. This room contains accommodation for 300 readers comfortably seated at separate desks, which are provided with all necessary conveniences. More recently, the accommodation having become again inadequate, it was resolved to separate the objects belonging to the natural history department from the rest, and to lodge them in a building by themselves. Accordingly a large natural history museum has been erected at South Kensington, and the specimens pertaining to natural history (including geology and mineralogy) have been transferred thither, but they still form part of the British Museum. Further additions to the Great Russell Street buildings were made in 1882. The British Museum is under the management of fortyeight trustees. It is open daily free of charge. Admission to the reading room as a regular reader is by ticket, procurable on application to the chief librarian, there being certain sim-ple conditions attached. The library, which is now one of the largest and most valuable in the world, has been enriched by numerous bequests and gifts, among others the library collected by George III during his long reign. copy of every book, pamphlet, newspaper, piece

of music, etc., published anywhere in British territory, must be conveyed free of charge to the British Museum. The museum contains eight principal departments; namely, the department of printed books, maps, charts. plans, etc., the department of manuscripts; the department of natural history; the department of oriental antiquities; the department of Greek and Roman antiquities; the department of Greish and medals; the department of British and mediæval antiquities and ethnography: and the department of prints and drawings.

Brit'tany or (Bretagne), an ancient duchy and province of France, corresponding nearly to the modern departments of Finisterre, Côtes du Nord, Morbihan, Ille et Vilaine, Loire Inférieure. It is supposed to have received its name from the Britons who were expelled from England and took refuge here in the fifth century. Along the coast and toward its seaward extremity, the country is remarkably rugged, but elsewhere there are many beautiful and fertile tracts. Fisheries employ many of the inhabitants. The people still retain their ancient language, which is closely allied to Welsh, and is exclusively used by the peasantry in the western part of the province.

Brix' ham, a seaport and sea-bathing resort. England, Devonshire, on the south of Torbay. Brixham was the place where William III landed, Nov. 4, 1688. Pop. 7,664.

Bri'za, a genus of grasses, commonly called quaking grass, maiden's hair, or lady's tresses. There are about thirty species, chiefly found in South America. Two are natives of Britain: these and other species are sometimes to be found in gardens as ornamental plants.

**Broach** (or Baroach) (bröch, ba-röch'), town in Guzerat (Gujerat), Hindustan, on the Nerbudda, one of the oldest seaports of Western India, with a considerable coasting trade. The town was taken by storm by the British in 1772, and, with the district, ceded to them by treaty with Scindiah in 1803. Pop. 37,281.

**Broad Arrow**, a government mark placed on British stores of every description (as well as on some other things), to distinguish them as public or crown property, and to obliterate or deface which is felony. Persons in possession of goods marked with the broad arrow forfeit the goods and are subject to a penalty. The origin of the mark is not clearly known.

**Broad' sword**, a sword with a broad blade, designed chiefly for cutting, formerly used by some regiments of cavalry and Highland infantry in the British service. The claymoror broadsword was the national weapon of the Highlanders.

**Brocade**', a stuff of silk, enriched with raised flowers, foliage, or other ornaments. The term is restricted to silks figured in the loom, distinguished from those which are embroidered after being woven. Brocade is in silk what damask is in linen or wool.

**Brock**, SIR ISAAC (1769-1812), British soldier. He became lieutenant in 1790, served in the West Indies until 1793, was with the expedition in Holland in 1799, and at the battle of Copenhagen in 1801. In 1802 he went to Canada, where he suppressed a troublesome conspiracy. In 1810 he commanded the troops in Upper Canada, and became lieutenant governor of that province. General Brock moved his command to Detroit in 1812, and on August 16 captured General Hull with his entire army. Meanwhile a U. S. force of 6,000 men was gathered on the frontier of Niagara. These were attacked by General Brock, who fell at the head of his troops.

**Brock'en**, the highest summit of the Harz Mountains (3,742 ft.), in Prussian Saxony. celebrated for the atmospheric conditions which produce the appearance of gigantic spectral figures in the clouds, being shadows of the spectators projected by the morning or evening sun.

**Brockton**, Plymouth co., Mass., 20 mi. s. of Boston. Railroad: Old Colony. Manufactures: sewing machines, needles, shoe machinery, and tools. Seat of extensive boot and shoe factories. There are large granite deposits in the vicinity. Pop. est. 1897, 27,300.

**Brockville**, in united counties of Leeds and Greenville, Province of Ontario, on St. Lawrence River, 125 mi. w. of Montreal. Railroads: Grand Trunk, Canadian Pacific, and the Brockville, Westport & Sault Ste. Marie. Industries: manufacture of stoves, hardware, boilers and agricultural implements, carriage works, glove and wringer factories, and boat building. Brockville was first settled in 1800. Pop. est. 1897, 0,000.

Broglie (brol-yē), a family of Italian origin distinguished in the annals of French wars and diplomacy. 1. FRANÇOIS MARIE, DUC DE, marshal of France (1071-1745). 2. VICTOR FRANÇOIS, DUC DE, eldest son of preceding, likewise marshal of France (1718-1804); served in Italy, Bohemia, Bavaria, and Flanders. Was minister of war for a short time in 1789, and took part in the invasion of Champagne, 1792. 3. CLAUDE VICTOR, PRINCE DE (1757-1794), the third son of Victor François. He entered at first into the views of the revolutionary party, and was appointed field marshal in the army of the Rhine, but upon his refusal to acknowledge the decree of August 10, suspending the royal authority, was deprived of his command and afterward summoned before the revolutionary tribunal, and led to the guillotine. 4. ACHILLE LEONCE VICTOR CHARLES, DUC DE, peer of France, son of Claude Victor (1785-1870). In 1816 he married a daughter of Madame de Staël and was made a member of the chamber of peers. After the revolution of 1830 the Duc de Broglie and Guizot were the chiefs of the party called Doctrinnaires. He was minister of public instruction for a short time in 1830, and minister of foreign affairs from October, 1832, to April, 1834. In 1849 he was a conservative member of the Legislative Assembly, and after the coup d'état he continued a bitter enemy of the imperial régime. His latter years were devoted to philosophical and literary pursuits, and in 1856 he was elected a member of the French Academy. 5. ALBERT, DUC DE, son of the preceding, statesman and author, b. 1821. His principal work.

The Church and the Roman Empire in the Fourth Century, has passed through many editions. He has been ambassador at London, minister of foreign affairs, and head of a short-lived royalist ministry in 1877.

Broke, PHILIP BOWES VERE (1776-1841), a British admiral; distinguished himself, particularly in 1813, as commander of the Shannon, in the memorable action which that vessel fought with the U. S. vessel Chesapeake, off the American coast, and in which the latter was captured.

**Broken-wind**, a disease in horses, often accompanied with an enlargement of the lungs and heart, which disables them for bearing fatigue. In this disease the expiration of the air from the lungs occupies double the time that the inspiration of it does; it requires also two efforts rapidly succeeding each other, attended by a slight spasmodic action, in order fully to accomplish it. It is caused by rupture of the air-cells, and there is no known cure for it.

Broker, an agent who is employed to conclude bargains or transact business for others in consideration of a charge or compensation, which is usually in proportion to the extent or value of the transaction completeb by him. and is called brokerage. In large mercantile communities the business of each broker is usually limited to a particular class of transactions, and thus there are brokers with several distinctive names, as bill brokers, who buy and sell bills of exchange for others; insurance brokers, who negotiate between underwriters and the owners of vessels and shippers of goods; ship brokers, who are the agents of owners of vessels in chartering them to merchants or procuring freights for them from one port to another; stock brokers, the agents of dealers in shares of joint-stock companies, government securities, and other monetary investments.

**Brom berg,** a town of Prussia, province of Posen. Among its industries are machinery, iron founding, tanning, paper, tobacco, chicory, pottery, distilling, and brewing. Pop. 34,064.

**Bro'mine**, a non-metallic element discovered in 1826. In its general chemical properties it much resembles chlorine and iodine, and is generally associated with them. It exists, but in very minute quantities, in sea-water, in the ashes of marine plants, in animals, and in some salt springs. It is usually extracted from bittern by the agency of chlorine. At common temperatures it is a very dark reddish liquid of a powerful and suffocating odor, and emitting red vapor. It has bleaching powers like chlorine, and is very poisonous. Its density is about four and a half times that of water. It combines with hydrogen to form hydrobromic acid gas. With oxygen and hydrogen it forms bromic acid. Bromide of potassium has sedative and other properties, and is used in medicine (scrofula, goiter, rheumatism, etc.); bromide of silter is used in photography.

**Bron' chi** ( $-k\bar{i}$ ), the two branches into which the trachea or windpipe divides in the chest, one going to the right lung, the other to the left, and ramifying into innumerable smaller tubes-the bronchial tubes.

Bronchitis (bron-kI'tis), an inflammation of the mucous membrane of the bronchial tubes, or the air-passages leading from the trachea to the lungs. It is of common occurrence, and may be either acute or chronic. Its symp-toms are those of a feverish cold, such as headache, lassitude, and an occasional cough, which are succeeded by a more frequent cough occurring in paroxysms, a spit of yellowish mucus, and a feeling of great oppression on the chest. Slight attacks of acute bronchitis are frequent and not very dangerous. They may be treated with mustard poultices or Acute bronchitis is often a fomentations. formidable malady, and requires prompt treatment. Its main symptoms are cough, shortness of breath, and spit. It is particularly apt to attack a person in winter; and in the end may cause death through the lungs be-coming unable for their work, and through accompanying complications.

**Bron'té**, a town of Sicily, 22 mi. n. n. w. of Catania, in a picturesque situation at the w. base of Mount Ætna. Nelson was created duke of Bronté by the Neapolitan government in 1799. Pop. 14,567.

Bron'te, CHARLOTTE (afterward MRS. NICH-OLLS) (1816-1855), English novelist. After an education received partly at home and partly at neighboring schools. Miss Bronté became a teacher, and then a governess in a family. In 1842 she went with her sister Emily to Brussels, with the view of acquiring a knowl-edge of the French and German languages, and she subsequently taught for a year in the school she had attended here. They resolved now to turn their attention to literary composition; and in 1846 a volume of poems by the three sisters was published, under the names of Currer, Ellis, and Acton Bell. It was issued at their own risk, and attracted little attention, so they quitted poetry for prose fiction, and produced each a novel. Charlotte (Currer Bell) entitled her production The Professor, but it was everywhere refused by the publishing trade, and was not given to the world till after her death. Emily (Ellis Bell) with her tale of Wuthering Heights, and Anne (Acton Bell) with Agnes Grey, were more successful. Charlotte's failure, however, did not discourage her, and she composed the novel of Jane Eyre, which was published in October, 1847. Its success was immediate and decided. Her second novel of Shirley appeared in 1849. Previous to this she had lost her two sisters, Emily dying on Dec. 19, 1848, and Anne on May 28, 1849. In the autumn of 1852 appeared Charlotte's third novel, Villette. Shortly after, she married her father's curate, the Rev. Arthur Bell Nicholls, but in nine months d. of consump-Her originally rejected tale of The Protion. fessor was published after her death, in 1857, and the same year a biography of her appeared from the pen of Mrs. Gaskell.

**Bronze**, an alloy formed wholly or chiefly of copper and tin, in variable proportions. It has been used from a very early period. Ar-

chæologists distinguish a bronze age in prehistoric times in Western Europe (intermediate between those of stone and iron), characterized by a general use of the alloy for cutting instruments and other objects. The "brass" of the Bible was probably of the nature of The addition of tin to copper gives bronze. rise to a product more fusible than copper, and thus better suited for casting. The allov The prois also harder and less malleable. portions in which copper and tin are combined to make bronze vary according to the object for which the alloy is designed. With about 7 parts copper to 1 part tin, bronze is very hard, brittle, and sonorous. Soft bronze, again, which bears drifting, rolling, and draw-ing is generally composed of 16 copper to 1 tin; while a flexible, tenacious alloy good for nails and bolts, is made of 20 copper to 1 tin. In preparing bronze for statues, bas-reliefs, etc., the qualities chiefly looked at are fusibility and hardness, also readiness to acquire a fine patina on exposure, though it appears this may be acquired by bronzes differing widely in composition. A common statue bronze is formed of copper 80, tin 20. Bell metal, for large bells, is generally made with about 3 parts copper to 1 part tin; for house bells, 4 copper to 1 tin. The bronze of bells (as of various other objects) sometimes contains a little zinc, lead, etc., in addition to the primary ingredients. The Chinese tam tams or gonge. are made of bronze forged by the hammer: they contain about 20 per cent. tin, the rest

copper only. The Japanese bronzes are remarkable for the amount of work put upon them. A workman will often spend years on a single piece. They contain a large proportion of lead, the average composition being copper 80 parts, lead 10, tin 4, zinc 2, and the remaining four parts consisting of iron, nickel, arsenic, silver, Bronze can be covered with a and gold. black, red, brown, or green patina, as desired. by suitable oxidation or sulphurization. Some important researches on bronze for field-guns have lately been made by Colonel Uchatius of Vienna; and the steel bronze he produces is equal to steel in hardness, homogeneousness, resistance, and other qualities; while it is less affected by atmospheric agency, and less costly. These new bronze guns have been found to bear several hundred discharges successively without the slightest apparent deformation or other injury. The alloy known as aluminium bronze is one endowed with great strength, malleability, and ductility. It is formed of 10 parts aluminium and 90 of copper. In the melting of ordinary bronze, reverberatory furnaces have long been used, as rapid fusion is desirable in order to prevent loss of tin, zinc, or lead by oxidation. Bell founders often use dome-topped furnaces, as their alloy does not require so intense a heat for fusion; but there is some waste of material with these. The copper is melted first, and covered with small charcoal or coke; and the tin is rapidly thrust down to the bottom of the melted mass.

In casting a bronze statue the work, though

generally supposed to be that of the artist, is in reality the work of a score or more of men. When the cast reaches the foundry it is carefully unpacked and laid upon the sand tables. The moist molding sand is then pounded into every line and crevice in the plaster mold. This sand, which is all imported, is so adhesive that it readily receives and retains all impressions. When any one part, for example the eyes, have been filled with the sand, the edges are smoothed off with a sharp knife and sprinkled with starch. Another section is then pounded in and trimmed as before and starched. When the molding is complete, liquid plaster of Paris is poured around it and allowed to harden, after which the whole mass is bound with iron bands and allowed to stand two days to dry. Then the bands are taken off and the layer of sand with its outside coat of plaster is separated from the cast, from which it has re-ceived an exact impression. The inside of the sand mold is then painted with plumbago. The core is made by hammering more of the black sand into the half mold and allowed to dry. When it is taken out it is a sand image of the original cast. Then it is cut down about a quarter of an inch all around according to the desired thickness for the bronze. The core is then painted with plumbago. After the molds and core have been completed they are put into an oven where they become exceed-ingly hard. The core is then fitted into the two halves of the mold leaving a space between them equal to the amount shaved off for the molten bronze. Air holes are made in the bottom of the mold to allow the gas to escape and a funnel is placed in the top. The whole mass is bound with wooden girders and iron bands. The molten bronze is brought to the mold in a crucible and poured into the mold. They must have enough bronze or the whole process is of no value, and the casting is ruined. When the molds are filled the bronze is allowed to cool, after which the outside plaster and the sand mold are removed, leaving the bronze figure. If the bronze were to be solid there would be no core. The bronze figure when it first appears is rough and has small seams where the pieces of the mold were put together. These are smoothed down with a file and the statue is burnished with wire

brushes and emery paper. Bronze Age, a term in prehistoric archæology, denoting the condition or stage of culture of a people using bronze as the material for cutting implements and weapons. As a stage of culture, it comes in between the use of stone and the use of iron for these purposes. It is not an absolute division of time, but a relative condition of culture, which in some areas may have been reached earlier, in others later, while in some it may have been prolonged, and in others brief, or even, as in the Polynesian area, it may have been non-existent in consequence of the people passing directly from the use of stone to that of iron. The implements and weapons of the Bronze Age include knives, saws, sickles, awls, gouges, hammers, anvils, axes, swords daggers, spears, arrows, shields. The composition of the bronze varied considerably, but may be stated in general as about 90 per cent. of copper to 10 per cent. of tin.

**Bronze-wing,** a name for certain species of Australian pigeons, distinguished by the bronze color of their plumage. The common bronze-winged ground-dove abounds in all the Australiau colonies, and is a plump bird, often weighing a pound, much esteemed for table.

**Brooch** (brôch), a kind of ornament worn on the dress, to which it is attached by a pin stuck through the fabric. They are usually of gold or silver, often worked in highly artistic patterns and set with precious stones. Brooches are of great antiquity, and were formerly worn by men as well as women, especially among the Celtic races. Among the Highlanders of Scotland there are preserved in several families ancient brooches of rich workmanship and highly ornamented. Some of them seem to have been used as a sort of amulet or talisman.

**Brooke,** SIR JAMES (1803-1808), celebrated as the Rajah of Sarawak. In 1838, having gone to Borneo, he assisted the sultan of Brunei (the nominal ruler of the island) in suppressing a revolt. For his services he was made rajah and governor of Sarawak, a district on the n.w. coast of the island, and being established in the government he endeavored to induce the Dyak natives to abandon their irregular and piratical mode of life and to turn themselves to agriculture and commerce; and his efforts to introduce civilization were crowned with wonderful success. He was made a K.C.B. in 1847, and was appointed governor of Labuan. His son now rules Sarawak.

**Brookline**, Norfolk co., Mass., on Charles River, 4 mi. w. of Boston. It was originally a part of Boston, but was set off and incorporated as an independent township in 1705. Railroad: Boston & Albany. Industry: electric company. Surrounding country agricultural. Pop. est. 1897, 17,000.

Brooklyn, a city and seaport, New York state, on the w. end of Long Island, separated from the city of New York by East River, a strait about three quarters of a mile broad, crossed by steam ferries, and by a suspension bridge having a total length of 5,989 ft., and a clear height above high water of 135 ft. Brooklyn is one of the finest cities in the U.S., with broad, straight streets, many of them planted with rows of trees. It has a river front of nearly 9 mi., and covers an area of 16,000 acres. It is popularly known as the "city of churches," having about 300 of all denomina-Among the public buildings are the tions. city hall, of white marble, the jail, the county courthouse, the academy of music, etc. The literary and charitable institutions are very numerous. The Atlantic Dock is one of the largest in the U. S., covering 40 acres. The U. S. navy yard, on Wallabout Bay, occupies 45 acres. Brooklyn is a favorite residence of the wealthy New Yorkers. It has a large trade. It was founded in 1625, and was the scene of

several memorable events of the Revolution. Pop. 806,343.

**Brooks,** PHILLIPS (1835-1893), American bishop. Graduated from Harvard, 1855, and studied theology in Alexandria, Va. From 1859-1860 he resided in Philadelphia and thereafter in Boston. Trinity church, Boston, is a memorial to his ministry. His Christmas carol, O Little Town of Bethlehem, is preserved. In 1885 he received the title D. D. from Oxford, England. He was consecrated bishop of Massachusetts 1891, and his last public appearance was at Newton. Of commanding appearance, rapid of speech, and clear of utterance, he held audiences spellbound. In 1892 he was elected bishop of Massachusetts Diocese. He d. Jan. 23, 1893.

**Brooks**, PRESTON S. (1819-1857), American politician. He became a member of Congress in 1853, and attained an unenviable notoriety in May, 1856, by making a ferocious assault upon Charles Sumner in the U. S. Senate chamber.

Broom, a peculiar name which includes several allied genera of plants distinguished by a leguminous fruit and papilionaceous flowers. The common broom of Europe is a bushy shrub with straight, angular branches of a dark-green color, deciduous leaves, and flow-ers of a deep golden yellow. Its twigs are often made into brooms, and are used for thatch for houses and cornstacks. They have also been used for tanning. The whole plant has a very bitter taste, and a decoction of it is diuretic, in strong doses emetic. White broom, or Portugal broom, has beautiful white flowers. Spanish broom, or Spart, is an ornamental flowering shrub growing in Africa, Spain, Italy, and the s. of France, and often cultivated in English gardens. It has upright, round branches, that flower at the top, and spearshaped leaves. Its fiber is made into various textile fabrics, and is also used in papermaking. Dyer's broom yields a yellow color used in dyeing. Butcher's broom is an evergreen shrub of the order Liliaceæ, and therefore entirely different from the brooms proper.

**Broom-corn, Broom-grass, a** plant of the order of grasses, with a jointed stem, rising to the height of 8 or 10 ft., extensively cultivated in the U. S., where the branched panicles are made into carpet-brooms and clothes-brushes. The seed is used for feeding poultry, cattle, etc.

**Broth,** the liquor in which some kind of flesh is boiled and macerated, often with certain vegetables, to give it a better relish. Beeftea is a kind of broth. Scotch broth is a kind of soup in which pot barley is an ingredient.

**Brough**, JOHN (1811-1865), born at Marietta, O. When a boy he was apprenticed to a printer and later studied at the Ohio University. He became editor of political journals giving considerable attention to oratory, and held several public offices. He was admitted to the bar in 1846. In 1846 he became governor of Ohio, receiving the vote of all parties who were in favor of prosecuting the war. His opponent was C. L. Vallandigham, who was running on an anti-war platform. Brough's majority was over 100,000 and has ever since been referred to by politicians as the "Old John Brough majority."

**Brougham** (brom or bro'em), a close fourwheeled carriage, with a single inside seat for two persons, glazed in front and with a raised driver's seat, named after and apparently invented by Lord Brougham.

**Brougham** (bröm or brö'ém). HENRY, Baron Brougham and Vaux (1778–1868), an English statesman and jurist. Along with Jeffrey, Horner, and Sydney Smith he bore a chief part in starting the *Edinburgh Review* in 1802. He entered Parliament, agitated for reforms, and his fearless and successful defense of Queen Caroline in 1820 and 1821 placed him on the pinnacle of popular favor. In the ministry of Earl Grey he accepted the post of lord chancellor, and was raised to the peerage (Nov. 22, 1830) with the title of Baron Brougham and Vaux. In this post he distinguished himself as a law reformer, and aided greatly in the passing of the Reform Bill of 1832. In



Branch of Common Broom. a .- Flowering Branch.

1834 the Whig ministry were dismissed, and this proved the end of his official life, though for years he continued an active member of the House of Lords. In legal procedure he was the means of introducing various reforms.

Broussais (brö-sä), FRANÇOIS JOSEPH VICTOR (1772-1838), French physician. He is regarded as the founder of what was called the physiological system of medicine. According to his theory irritability was the fundamental property of all living animal tissues, and every

#### Brouwer

malady proceeded from an undue increase or

diminution of that property. Brouwer (brou'ver) (or Brauwer), ADRIAN (1608-1640). He was a pupil of Franz Hals, and was patronized by Rubens; but was of very dissipated habits. His works are chiefly tavern scenes and other delineations of low life, and rank among the best of their kind.

Brown, a color which may be regarded as a mixture of red and black, or of red, black, and yellow. There are various brown pigments, mostly of mineral origin, as bistre, umber, cappagh brown, etc.

**Brown**, CHARLES BROCKDEN (1771-1810), an eminent novelist. He was destined for the law, but the term intended for preparatory legal study was principally occupied with literary pursuits. His novel Wieland, or the Transformation, was published in 1798: Ormond, or the Secret Witness, in 1799; and Arthur Mervyn in 1800. In the last-named work the ravages of the yellow fever, which the author had witnessed in New York and Philadelphia, are painted with terrific truth. He was originator of the Monthly Magazine and American Review. He also founded in 1805 the Literary Magazine and American Register, which he edited for five years. Among his other works are Clara Howard and Jane Talbot.

Brown, GEORGE (1818-1880), a Canadian statesman. He was educated in Scotland, came to New York in 1838, and published there the British Chronicle. In 1843 he went to Canada, and the following year issued the first number of the Toronto Globe. He sat in the Dominion Parliament 1851-67. In 1873 he entered the Senate. He was shot by a discharged employé, and died from the effects of his wound two months later.

Brown, HENRY KIRKE (1814-1886), American sculptor. At an early age he made an excellent portrait of an old man. He studied painting with Chester Harding of Boston, and anatomy in Cincinnati, where he modeled his first bust. In 1840 he went to Troy and Albany, executing many portrait busts of prominent persons. He was in Italy 1842-1846. He returned to New York and opened a studio, where the first bronze-casting was done in this city. In 1850 he removed to Brooklyn, and was engaged with the statue of De Witt Clin-ton for Greenwood cemetery for two years, the first bronze statute cast in America. In 1857 he was invited by South Carolina to make the pediment for the statehouse in Columbia. It represented a colossal figure of South Carolina, with Justice and Liberty at either side, and industries represented by negro slaves at work in the cotton and rice plantations. This work was destroyed by Sherman's soldiers in 1865. Mr. Brown's principal statues are: Abraham Lincoln in Prospect Park, Brooklyn (1866); Gen. Nathanael Greene for the state of Rhode Island, presented to the National Gallery in the capitol, Washington (1867); Abra-hum Lincoln, Union Square, New York; Eques-trian Status of General Scott, Scott Circle, Washington (1872); Gen. George Clinton, presented by the state of New York to the U.S.

government (1873); Gen. Philip Kearney, in Newark, N. J.; Richard Stockton, for New Jersey (1874); an Equestrian Statue of Gen. Nathanael Greens, for the U.S. government (1875-76).

Brown, JOHN (1800-1859), an American abolitionist, celebrated as the originator of the Harper's Ferry insurrection, was b. in Tor-rington, Conn., May 9. Originally intended for the church, he was compelled to give up study on account of inflammation in the eyes. He then took up the business of a tanner. which he carried on for twenty years. Not being very successful in trade he started business as a wool dealer in Ohio in 1840. Failing in this he removed to Essex co., N. Y. in 1849, and began to reclaim a large tract of land which had been granted to him. After two years he returned to Ohio and resumed his business as a wool dealer. In 1855, with his four sons, he migrated to Kansas and at once took a prominent position as an anti-slavery man. He became renowned in the fierce border warfare which was carried on for some years in Kansas and Missouri, and gained particular celebrity by his victory at Osawat-About this time he seems to have omie. formed the idea of effecting slave liberation by arming the slaves and inciting them to rise in revolt against their oppressors. As the first step in this scheme, he designed to seize the arsenal of Harper's Ferry, where an immense stock of arms was kept. On the night of Oct. 10, 1859, he, with a handful of well-armed and resolute companions, overpowered the small guard and gained possession of the arsenal. During the next morning he made prisoners of some of the chief men of the town, but there was no rising of slaves as had been expected. The townsmen, too, recovered from their astonishment at the audacity of the act, and a bold attack was made on the arsenal. Fresh assailants poured in from the country round, and on the morning of the 18th the arsenal was recaptured, and Brown, severely wounded. was taken prisoner. On October 27, he was tried at Charlestown for treason and murder, and was found guilty. The sentence passed upon him, death by hanging, was carried into execution December 2. He was immortalized by the Union soldiers in the war song, John Brown's body lies a-moldering in the grave.

Brown, JOHN (1735-1788), author of the Brunonian system in medicine. He maintained that the majority of diseases were proofs of weakness and not of excessive strength or excitement, and therefore contended that indiscriminate lowering of the system, as by bleeding, was erroneous, and that supporting treatment was required. His system gave rise to much opposition, but his opinions materially influenced the practise of his professional successors.

Brown, JOSEPH EMERSON. b. 1821. He was elected to the Georgia state senate in 1849, became judge in 1855, and was governor 1857-1865. At the outbreak of the Civil War, Governor Brown, who was an active secessionist, seized the U. S. forts and the arsenal at Augusta, Ga. After the war he advised his state to accept the terms of reconstruction offered, and for a time he acted with the Republican party. He was defeated for U. S. senator in 1868, and was appointed chief justice of the state supreme court in the same year. In 1872 he again joined the Democratic party during the Greeley campaign; in 1880 was elected U. S. senator for the unexpired term of General Gordon, and was re-elected in 1884.

**Brown**, ROBERT (1773-1858), a noted English botanist. In 1800 he was appointed naturalist to Flinders's surveying expedition to Australia. He returned with nearly 4,000 species of plants, and was shortly after appointed librarian to the Linnæan Society. He was the first English writer on botany who adopted the natural system of classification, which has since entirely superseded that of Linnæus. As a naturalist Brown occupied the very highest rank among men of science. A collection of his miscellaneous writings has been published by the Ray Society.

Browne, CHARLES FARRAR, see Artemus Ward.

Browne (1815-1882), HABLOT KNIGHT, an English designer of humorous and satirical subjects, and an etcher of considerable skill, better known by the pseudonym of "Phiz," born at Kennington, Surrey. In 1835 he succeeded Seymour as the illustrator of Dickens's *Pickwick*, and was afterward engaged to illustrate Nicholas Nickleby, Dombey and Son, Martin Chuezlevit, Darid Copperfield, and other works of that author. He also illustrated the novels of Lever, Ainsworth, etc., besides sending many comic sketches to the illustrated serials of the times.

Browne, SIR THOMAS (1605-1682), an English physician and writer. In 1642 was published his *Religio Medici* (A Physician's Religion), which excited the attention of the learned, not only in England but throughout Europe, gave rise to doubts of the author's orthodoxy, and was translated into various languages. In 1646 appeared his *Treatise on Vulgar Er*rors. In 1658 his *Hydriotaphia* (or *Treatise* on Urn-Burial) appeared conjointly with his Garden of Cyrus. He was a believer in alchemy, astrology, and witchcraft.

**Browne**, WILLIAM (1591-1645), an English poet. In his twenty-third year he published his Britannia's Pastorals, which met with great approbation; and in the following year appeared his Shepherd's Pipe. In 1616 he published the second part of his Britannia's Pastorals, which met with equal success with the former.

**Brownie**, in Scotland an imaginary spirit formerly believed to haunt houses, particularly farmhouses. Instead of doing any injury he was believed to be very useful to the family, particularly to the servants if they treated him well, for whom he was wont to do many pieces of drudgery while they slept. The brownie bears a close resemblance to the Robin Goodfellow of England, and the Kobold of Germany.

Browning, ELIZABETH BARRETT (1809–1861),

## Browning

English poetess. Her father, Edward Moulton, took the name of Barrett, on succeeding to some property. She grew up at Hope End, near Ledbury, Herefordshire, where her father possessed a large estate. Her bodily frame was from the first extremely delicate, and she had been injured by a fall from her pony when a girl, but her mind was sound and vigorous, and disciplined by a course of severe and exalted study. She early began to commit her thoughts to writing, and in 1826 a volume, entitled An Essay on Mind, with Other Poems, appeared of her authorship. A money catastrophe compelled her father to settle in London, and her continued delicacy received a severe shock by the accidental drowning of her brother, causing her to pass years in the confinement of a sickroom. Her health was at length partially restored, and in 1846 she was married to Mr. Robert Browning, soon after which they set-tled in Italy, and continued to reside for the most part in the city of Florence. Her Prome-theus Bound (from the Greek of Æschylus) and Miscellancous Poems appeared in 1833; the Seraphim and Other Poems in 1838. In 1856 a collected edition of Mrs. Browning's works appeared, including several new poems, and among others Lady Geraldine's Courtship. Casa Guidi Windows, a poem on the struggles of the Italians for liberty in 1848-40, appeared in 1851. The longest and most finished of all her works, Aurora Leigh, a narrative and didactic poem in nine books, was published in 1857. Poems before Congress, appeared in 1860, and two posthumous volumes, Last Poems, 1862, and The Greek Christian Poets and the English Poets (prose essays and translations), 1863, were edited by her husband.

Browning, ROBERT (1812-1889), an English poet. In 1846 he married Elizabeth Barrett, and resided chiefly in Italy, making occasional visits to England. His first poem, Pauline, was published in 1833; followed by Paracelsus in 1835; Stafford, a Tragedy (1837), produced at Covent Garden, Macready and Helen Faucit playing the chief parts. Sordello appeared in 1840, followed by the series called Bells and Pomegranates, including the three plays Pippa Passes, King Victor and King Charles, and Colombe's Birthday; four tragedies: The Return of the Druses, A Blot on the Scutcheon, Luria, and The Soul's Tragedy; and a number of Dramatic Lyrics, among them the well-known Pied Piper of Hamelin, and How they Brought the Good News from Ghent to Air (1841-46). Between 1846 and 1868 appeared Men and Women, Christmas Ere and Easter Day; Dramatis Persona, and some shorter poems. The Ring and the Book (1869). his longest poem, was followed by Balustion's Adventure; and Prince Hohenstiel-Schwangau (1871); Fifine at the Fair (1872); Red Cotton Nightcap Country (1873); Aristophanes's Apology; Inn Album (1873); Pacchiarotto (1876); La Sai-saiz (1878); Dramatic Idylls (1879-80); Jocoseria (1883); Ferishtah's Fancies (1884); and Parley-ings with Certain People of Importance in Their Day (1887). Browning received the degree of D.C.L. from Oxford in 1882. A Browning Society for the study of his works was formed

in 1881, under whose auspices several of his dramas have been performed. His poems are often difficult to understand from the quick transitions of thought, and they are not infrequently rugged and harsh in expression, yet they are among the chief poetic utterances of the century.

**Brownlow**, WILLIAM G. (1805–1877), a Southern Unionist, born in Virginia. He became a Methodist preacher, and afterward edited various newspapers in Tennessee. He became governor of that state in 1864, served two terms, and was in 1869 elected to the U. S. Senate. "Parson Brownlow," as he was called, edited the Knoxville Whig until it was suppressed by the Confederacy, and was always loyal to the Union cause.

Brown-Sequard, EDOUARD (1818-1894), an American physician. His father was an American sea captain, his mother a Frenchwoman. He was a professor in the medical department of the Harvard University, 1864-68, and was connected with the Virginia Medical College. In 1869 he was appointed professor of pathology in the School of Medi-cine at Paris, in 1873 established a medical journal in New York, and in 1878 became professor of medicine in the College of France. He wrote many scientific papers, and in 1889 made public the results of some experiments which he had made on human subjects with subcutaneous injections of an infusion pre-pared from the testes of animals. The effect pared from the testes of animals. of this treatment was claimed to be powerfully tonic and stimulant, but it proved to be of no practical value.

Brownson, ORESTES AUGUSTUS (1803-1876), American clergyman. He joined the Presbyterian Church in 1822, but changed his views and became a Universalist in 1825. He conducted the Gospel Advocate, the organ of the latter church, and was afterward editor of the Philanthropist. In 1828, he tried to form in New York a workingman's party. He was drawn to the Unitarians by Doctor Channing, and in 1832 became pastor of a congregation of this denomination. In 1838 he established the Boston Quarterly Review, of which he was the proprietor, and almost sole writer. This was afterward merged into the Democratic Review of New York. In 1844 he became a Roman Catholic, and afterward remained a layman in that faith. Subsequently he founded Bronca-son's Quarterly Review. This was the first American periodical printed in England, where it had a circulation among Roman Catholics.

**Brown Paper**, a coarse kind of wrapping paper made from unbleached materials.

**Brownsville**, Cameron co., Tex., on the Rio Grande River, and Rio Grande Railroad. It is the center of a stock-raising district and has a trade with Mexico. Pop. est. 1897, 6,200.

trade with Mexico. Pop. est. 1897, 6,200. Brown University, Providence, R. I. was founded in 1764, the original name being Rhode Island College. It is one of the best equipped universities in the U. S. It has an annual income of nearly \$200,000, about 900 students, 78 professors and instructors, 16 buildings, and a library of 80,000 volumes. It is co-educational, and Baptist in denomination.

Bruce, BLANCHE K., born a slave in Virginia, 1841; came north during the Civil War, and studied at Oberlin College. Ohio. In 1875, he became U. S. senator from Mississippi, and on May 19, 1881, was appointed register of the treasury by President Garfield.

Bruce, a family name distinguished in the history of Scolland. The family of Bruce was of Norman descent, its founder having obtained from William the Conqueror large grants of land in Northumberland. After being frequently involved in border warfare with the Scots, the house of Bruce received, about 1130, from David I a grant of the lands of Annandale, thus obtaining a footing in the south of Scotland.

Bruce, EDWARD, a brother of Robert I, who, after distinguishing himself in the war of independence, crossed in 1315 to Ireland to aid the native septs against the English. After many successes he was crowned king of Ireland at Carrickfergus, but fell in battle near Dundalk in 1318.

Bruce, ROBERT (1274-1329), the greatest of the kings of Scotland. In 1296, as Earl of Carrick, he swore fealty to Edward I, and in 1297 fought on the English side against Wallace. He then joined the Scottish army, but in the same year returned to his allegiance to Edward until 1298, when he again joined the national party, and became in 1299 one of the four regents of the kingdom. In the three final campaigns, however, he resumed fidelity to Edward, and resided for some time at his court; but, learning that the king meditated putting him to death on information given by the traitor Comyn, he fled in February, 1306, to Scotland, stabbed Comyn in a quarrel at Dunfries, assembled his vassals at Lochmaben Castle, and claimed the crown, which he received at Scone, March 27. Being twice defeated, he dismissed his troops, retired to Rathlin Island, and was supposed to be dead, when, in the spring of 1307, he landed on the Carrick coast, defeated the Earl of Pembroke at London Hill, and in two years had wrested nearly the whole country from the English. He then in successive years advanced into England, laying waste the country; and on June 24, 1314, defeated at Bannockburn the English forces advancing under Edward II to the relief of the garrison at Stirling. In 1316 he went to Ireland to the aid of his brother Edward, and on his return in 1318, in retaliation for inroads made during his absence, he took Berwick and harried Northumberland and Yorkshire. Hostilities continued until the defeat of Edward near Byland Abbey in 1323, and though in that year a truce was concluded for thirteen years it was speedily broken. Not until March 4, 1328, was the treaty concluded by which the independence of Scotland was fully recognized. Bruce did not long survive the completion of his work, dying at Cardross Castle on June 7, 1329. He was twice marrled: first, to a daughter of the Earl of Mar, Isabella, by whom he had a daughter, Marjory, mother

of Robert II; and then to a daughter of Aymer de Burgh, Earl of Ulster, Elizabeth, by whom he had a son, David, who succeeded him.

Brueys-d' Aigailiers (bru-å-då-gål-yå), FRANÇOIS-PAUL (1753-1798), a French admiral, became captain in 1792, and vice admiral in 1798. He successfully conveyed Bonaparte and his army to Egypt in 1798, but was killed in the subsequent naval battle in the Bay of Aboukir shortly before his ship, the Orient, blew up.

Bruges (brüzh) an old walled city of Bel-gium, capital of West Flanders, 57 mi. n.w. Brussels, on the railway to Ostend. It is an important canal center, and has over fifty bridges, all opening in the middle for the passage of vessels. The principal canals are those to Sluis, Ghent, and Ostend, on all of which large vessels can come up to Bruges. In the thirteenth and fourteenth centuries it was one of the chief commercial places in Europe, and an important member of the Hanseatic League. Toward the end of the fifteenth century it began to decline, but still carries on a considerable trade with the n. of Europe, and is by its canals an entrepôt of Belgian commerce. Among its more noteworthy buildings are the Halles, a fine old building, with a tower 354 ft. high, in which is a fine set of chimes; the Hotel de Ville, the Bourse, and the Palace of Justice; the church of Nôtre Dame, with its elevated spire and splendid tombs of Charles the Bold and Mary of Burgundy, etc. The town possesses interesting works of art by Jan Van Eyck, Memling, the Van Oosts, etc. Textile goods, lace, etc., are manufactured. Pop. 46,274.

**Brumaire** (brü-mär), the second month in the calendar adopted by the first French Republic, beginning on October 23, and ending November 21.

**Brummell**, GEORGE BRYAN (Beau Brummell) (1778-1840), son of a clerk in the Treasury, b. in London in 1778. He was educated at Eton and at Oxford, and at the age of sixteen made the acquaintance of the Prince of Wales, afterward George IV, who made him a cornet in his own regiment of the Tenth Hussars, and secured his rapid promotion. The death of his father in 1794 brought him a fortune of \$150,000, which he expended in a course of sumptuous living, extending over twenty-one years, during which his *dicta* on matters of etiquette and dress were received in the *beau* monde as indisputable. His creditors at length became clamorous, and in 1816 he took refuge in Calais, where he resided for many years. partly supported by the remains of his own fortune, and partly by remittances from friends in England. Subsequently (1830) he was appointed consul at Caen, but on the abolition of the post was reduced to absolute poverty, and died in a lunatic asylum at Caen.

Brun anburgh, the scene of a British battle in which Athelstan and the Anglo-Saxons defeated a force of Scots, Danes, etc., in 937; locality very doubtful.

Brune (brön), GUILLAUME MARIE ANNE (1763-1815), marshal of France, son of a lawyer

at Brive-la-Gaillarde. In 1793 he joined the army, and afterward distinguished himself at Arcola and Verona as general of brigade in the Italian army. In 1799 he compelled the British and Russians to evacuate the north of Holland. In 1800 he pacified La Vendée, and, replacing Masséna as commander of the Italian army, led his troops over the Mincio, conquered the Austrians, passed the Adige, took possession of Vicenza and Roveredo, and hastened the conclusion of peace. In 1802-4 he was ambassador at Constantinople, and the latter year was made a marshal. Losing the favor of Napoleon, he remained without employment for some years, but on the return of Napoleon from Elba he received an important command in the south of France, which he was soon after compelled to surrender at the second restoration. He then set out for Paris, but was attacked and brutally killed by the populace at Avignon

**Brunchilda**, a Visigothic princess, married to Siegebert I, king of Austrasia, in 568. To avenge her sister (assassinated at the instigation of Fredegonde) she involved her husband in a war with his brother Chilperic, in the course of which Siegebert was murdered, A. D. 575, and she herself taken prisoner. She induced Meroveus, one of Chilperic's sons, to marry her, effected her escape, recovered her authority and maintained it till 613, when she was captured by Fredegonde's son, Clothaire II of Soissons, who had her torn to pieces by wild horses as the murderess of ten kings and royal princes.

**Brunei** (brö'nt) (Bruni), an independent Malayan sultanate on the northwest coast of Borneo, between Sarawak and British North Borneo, exporting sago, gutta-percha, rubber, etc.; pop. 125,000. Its capital, also called Brunei, is situated on the river of same name, about 14 mi. from its mouth, the houses being mostly raised above the water on posts. It has a considerable trade, its pop. being 30,000 to 55,000.

**Brunel'**, ISAMBARD KINGDOM (1806-1859), English engineer, son of Mark Isambard Brunel. He was educated at the Henri IV College, Paris; and commenced practical engineering under his father, acting at twenty as resident engineer at the Thames Tunnel. Among his best-known works were the Great Western, Great Britain, and Great Eastern steamships; the entire works on the Great Western Railway, to which he was appointed engineer in 1833, the Hungerford Suspension Bridge. docks at Plymouth, Milford Haven, etc.

**Brunel'**, MARK ISAMBARD (1769-1849), a distinguished engineer. He was educated in Rouen, his mechanical genius early displaying itself. In 1786 he entered the French naval service, and in 1793 only escaped proscription by a hasty flight to America. He was afterward employed as engineer and architect in the city of New York, erecting forts for its defense, and establishing an arsenal and foundry. In 1799 he proceeded to England and settled at Plymouth, rapidly winning reputation by the invention of an important machine

for making the block-pulleys for the rigging of ships. Among his other inventions were a machine for making seamless shoes, machines for making nails and wooden boxes, for ruling paper and twisting cotton into hanks, and a machine for producing locomotion by means of carbonic acid gas; but his greatest engineering triumph was the Thames Tunnel, commenced March, 1825, and opened in 1843. Brunelleschi (brö-nel-es'kē), FILIPPO (1377-

When at Rome with 1446), Italian architect. Donatello he conceived the idea of bringing architecture back to Græco-Roman principles as opposed to the dominant Gothic. In this he was successful, his work opening the way for Alberti, Bramante, Vignola, and Palladio. His great achievement was the dome of the cathedral of Santa Maria at Florence, the possibility of which was denied by other archi-tects. It has remained unsurpassed, the dome of St. Peter's, though it excels in height, being inferior to it in massiveness of effect. Other important works by him were the Pitti Palace at Florence, the churches of San Lorenzo and Spirito Santo, and the Capella dei Pazza.

Bruni. See Brunei.

**Brunings** (brö'ningz), CHRISTIAN (1736–1805), a great hydraulic architect of Holland; appointed general inspector of rivers by the States of Holland in 1769.

**Brünn** (brun), an Austrian city, capital of Moravia, on the railway from Vienna to Prague, nearly encircled by the rivers Schwarzawa and Zwittawa. It contains a cathedral and other handsome churches; a landhaus, where the provincial assembly meets, and several palaces; and has extensive manufactures of woolens, which have procured for it the name of the Austrian Leeds. It is the center of Moravian commerce, a great part of which is carried on by fairs. Near it is the fortress of Spielberg, in which Trenck and Silvio Pellico were confined. Pop. 95,342.

**Bruno,** The Great (925-965). Archbishop of Cologne and Duke of Lorraine, third son of Henry the Fowler, and brother of the Emperor Otho I. He was employed in various important negotiations, and was a great patron of learning. Commentaries on the Pentateuch, and some biographies of saints, are ascribed to him.

**Bruns' wick**, a duchy and sovereign state in the n.w. of Germany, area 1,425 sq. mi. It is divided into several detached portions, surrounded by the Prussian provinces of Hanover, Saxony, and Westphalia. A good portion of it is hilly or undulating, and it partly belongs to the Harz mountain system. Mining is carried on chieffy in the Harz, and the minerals include iron, lead, copper, brown coal, etc. About half the surface is arable, and the chief cultivated products are grain, flax, hops, tobacco, potatoes, and fruit. Brewing, distilling, the manufacture of linens, woolens, and leather, the preparation of paper, soap, tobacco, beet-sugar, with agriculture and mining, afford the principal employment of the people. As a state of the German Empire it sends two members to the Bundesrath and, three deputies to the Reichstag. In its internal government it is a constitutional monarchy. On the death of the Duke of Brunswick without issue in 1884 the Duke of Cumberland claimed the succession. Bismarck, however, interfered, and the Brunswick diet decided Albrecht of Prussia being elected to the post. Pop. 403,773. Brunswick, the capital, is situated on the Oker, and on the railway from Hanover to Berlin. The older streets are narrow, tortuous, and antiquated. The principal buildings of note are the ducal palace. the cathedral of St. Blaise (1173), St. Catherine's church (dating from 1172), and St. Magnus's (1031), the Gewandhaus, and the fine old Gothic Council House. The educational institutions include the polytechnic school, a gymnasium. etc., and there are a city museum, a ducal mu-seum, and a public library. The principal manufactures are wool, linen, jute, machinery, sewing machines, etc. Pop. 101,047.

**Brunswick**, Glynn co., Ga., on Oglethorpe Bay, 90 mi. s. of Savannah. Surrounding country agricultural. Railroads: Southern Railroad, and B. & W. part of the Plant System. Industries: two barrel factories, two iron foundries, and oyster-canning factory. The town was laid out in 1837, and became a city in 1856. Pop. est. 1897, 12,000.

Branswick, Cumberland co., Me., on the Androscoggin River. Railroad: Maine Central. It is the seat of Bowdoin College. Principal industries: paper, cotton, and lumber manufactories. Pop. est. 1897. 6.500.

cipal industries: paper, cotton, and lumber manufactories. Pop. est. 1897, 6,500. Brunswick, Family of, a distinguished family founded by Albert Azo II, Marquis of Reggio and Modena, a descendant, by the female line, of Charlemagne. In 1047 he married Cunigunda, heiress of the Counts of Altorf, thus uniting the two houses of Este and Guelph. From his son, Guelph. who was created Duke of Bavaria in 1071, and married Judith of Flanders, a descendant of Alfred of England, descended Henry the Proud. who succeeded in 1125, and by marriage acquired Brunswick and Saxony. Otho, the great grandson of Henry by a younger branch of his family, was the first who bore the title of Duke of Brunswick (1235). By the two sons of Ernst of Zell, who became duke in 1532, the family was divided into the two branches of Brunswick-Wolfenbüttel (II) and Brunswick-Hanover, from the latter of which comes the present royal family of Britain. The former was the German family in possession of the duchy of Brunswick until the death of the last duke in 1884. George Louis, son of Ernst Augustus and Sophia, granddaughter of James I of England, succeeded his father as elector of Hanover in 1698, and was called to the throne of Great Britain in 1714 as George I.

**Brunswick Black**, a varnish composed chiefly of lamp-black and turpentine, and applied to cast-iron goods. Asphalt and oil of turpentine are also ingredients in some kinds of it.

Brusa (Broussa) (brö'så) (or Bursa), a Turkish city in Asia Minor: s. of the Sea of Mar-

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mora, about 20 mi. distant from its port, Mudania, with a pop. of 72,560 Turks, Greeks, Armenians, and Jews, engaged in commerce, and the manufacture of satins, silk stuffs, carpets, gauze, etc. The town is situated in a fertile plain, which is enclosed by the ridges of Olympus, and abounds in hot springs. Brusa represents the ancient Prusa, long capital of Bithynia, and one of the most flourishing towns in the Greek empire of Constantinople. It was the residence of the Turkish sovereigns from 1329 until the transference of the seat of empire to Adrianople in 1365.

**Brush**, a well-known implement used for various purposes. There are two chief varieties, those with stiff hair or fibers, and those with flexible. The former are made of hog's bristles, whalebone fibers, vegetable fibers of various kinds (brush-grass, palms, etc.), and sometimes wire is made to serve the same purpose. The latter are made of hog's bristles, or of the hair of the camel, badger, squirrel, sable, goat, etc., and are chiefly used for painting, the smallest kinds being called *pencils*.

Brush, CHARLES FRANCIS, b. 1849: an American inventor in Ohio; graduated at the University of Michigan in 1869. He became an analytical chemist, and turned his attention to electric lighting. He invented a dynamo and an electric lamp, which were successfully introduced in 1876, and he has more than fifty patents relating to these inventions.

Brus'sels, the capital of Belgium, and of the province of Brabant. The city consists of a northwestern or lower portion and a south-eastern or upper portion. The older part is surrounded with fine boulevards on the site of its fortifications, and in many places presents a congeries of twisted streets. The upper town, which is partly inside the boulevards and partly outside, is the finest part of the city, and contains the king's palace, the palace of the chambers, the palace of justice (a magnificent new building of colossal proportions in the classical style, ranking among the finest in Europe), the palace of the fine arts, the public library and museum, etc.; and has also a fine park of 17 acres, around which most of the principal buildings are situated. The lower town retains much of its ancient appearance. The hôtel de ville (1401-55) is an imposing Gothic structure, with a spire 364 ft. in height, the square in front of it being perhaps the most pictorial of all the public places of Brussels. The cathedral of Saint Gudule (dating in part from the thirteenth century) is the finest of many fine churches, richly adorned with sculptures and paintings. The whole town is rich in monuments and works of art. The institutions comprise a university, an academy of science and the fine arts and polytechnic school; one of the finest observatories in Europe; a conservatorium of music; a public library, containing 400,000 volumes and 30,000 MSS.; a picture gallery, with the finest specimens of Flemish art; and many learned societies and educational organizations. The manufactures and trade are greatly promoted by canal communications with Charleroi, Mechlin, Antwerp, and the ocean, and by the network of Belgian railways. The industries are varied and important. Lace was an ancient manufacture, and is still of great importance; the manufacture of cotton and woolen fabrics, paper, carriages, and many minor manufac-tures are carried on. There are breweries, dis-tilleries, sugar refineries, foundries, etc. The language spoken by the upper classes is French, and Flemish is that of the lower; but German, Dutch, and English are also a good deal spoken. During the Middle Ages Brussels did not attain great importance. It was walled by Bald-ric of Louvain in 1044; was more completely fortified in 1380; and was twice burned and once ravaged by the plague during the fifteenth century. It was bombarded and burned by the French in 1695; and was again taken by the French in 1794, and retained till 1814, when it became the chief town of the department of the Dyle. From 1815 to 1830 it was one of the capitals of the Kingdom of the Netherlands, and in 1830 was the chief center of the revolt which separated Belgium from Holland. Pop. 176,138.

**Brussels Sprouts**, one of the cultivated varieties of cabbage having an elongated stem 4 or 5 ft. high, with small clustering green heads like miniature cabbages. They are cultivated in great quantities near Brussels.

**Brutus** (or Brute), the first king of Britain: a purely mythical personage, said to have been the son of Sylvius, and grandson of Ascanius, the son of Æneas. He landed in Devonshire, destroyed the giants then inhabiting Albion, and called the island from his own name. At his death the island was divided among his sons: Locrine, Cumber, and Albanact.

**Brutus**, DECIMUS JUNIUS, served under Julius Cæsar in Gaul, and was afterward commander of his fleet, but, like his relative, Marcus Junius Brutus, joined in the assassination of Cæsar. He was afterward for a short time successful in opposing Antony, but was deserted by his soldiers in Gaul and betrayed into the hands of his opponent, who put him to death in B. c. 43.

Brutus, LUCIUS JUNIUS, ancient Roman hero, son of Marcus Junius by the daughter of the elder Tarquin. He saved his life from the persecutions of Tarquin the Proud by feigning himself insane, whence his name Brutus (stupid). On the suicide of Lucretia, however, he threw off the mask, and headed the revolt against the Tarquins. Having secured their banishment, he proposed to abolish the regal dignity and introduce a free government, with the result that he was elected to the consulship, in which capacity he condemned his own sons to death for conspiring to restore the monarchy. He fell in battle B. c. 509.

**Brutus**, MARCUS JUNIUS (B. c. 85-42), a distinguished Roman; was at first an enemy of Pompey, but joined him on the outbreak of civil war until the battle of Pharsalia. He then surrendered to Cæsar, who made him in the following year governor of Cisalpine Gaul, and afterward of Macedonia. He soon, how-

ever, joined the conspiracy against Cæsar, and by his influence insured its success. After the assassination he took refuge in the East, made himself master of Greece and Macedonia, and with a powerful army joined Cassius in the subjugation of the Lycians and Rhodians. In the meantime the triumvirs, Octavianus, Antony, and Lepidus, had been successful at Rome. and were prepared to encounter the army of the conspirators, which, crossing the Hellespont, assembled at Philippi in Macedonia. Cassius appears to have been beaten at once by Antony: and Brutus, though temporarily successful against Octavianus, was totally defeated twenty days later. He escaped with a few friends: but, seeing that his cause was hopelessly ruined, fell upon the sword held for him by his confidant Strato, and died.

Bryan, WILLIAM JENNINGS, was b. in Salem, Ill., March 19, 1860. He graduated from Illinois College, Jacksonville, Ill., in 1881, and immediately entered the Union College of Law at Chicago. In 1883 he began the practise of his profession in Jacksonville, Ill. A year later he married Mary Baird. In 1887 he removed to Lincoln, Neb., and has been actively constate ever since, being elected to the 52d and 53d Congresses. In 1896 he was nominated by the Democratic National Convention for president of the United States, but at election was defeated by William Mc Kinley, Republican. The main issue of the campaign was the money question, Bryan and his constituents advocating the free coinage of silver at the ratio of 16 to 1. The Republican platform rather favored the gold standard. Bryan has written a book, "The First Battle," which contains a history of the campaign together with a number of his own speeches on the silver question. He was the first presidential nominee to take the stump in his own behalf. Bryan has three children, two girls and a boy. He is now on the lyceum platform.

Bryant, WILLIAM CULLEN (1794-1878), a famous American poet and journalist, b. at Cummington, Mass. His father, Peter Bryant, physician, encouraged his literary tastes. He contributed his first poem to a country newspaper when but ten years old. He published in Boston (1807) The Embargo. A second edi-tion, including the Spanish Revolution, appeared in 1809. Bryant entered Williams College (1810), but left to study law at Worthington. He removed to Bridgewater (1814) to continue his studies, and was admitted to the bar (1815) at Plymouth. At Great Barrington he became distinguished as an orator. Married Miss Frances Fairchild (1821). Thanatopsis. published in the North American Review (1817), won him fame, as did his Essay on American Poetry. He gave up law and removed to New York, 1825. He became editor of the New York Review, and in 1826 assistant editor of the Evening Post; later (1829) he became editor-in-chief. He entered warmly into the antislavery struggle, and helped to form the Republican party (1856). To the Post Bryant gave a dignified

and high moral tone. A complete collection of Bryant's poems was reprinted in London with a laudatory preface by Irving. His prose is marked by clearness, vigor, and purity of diction, while his poetry is both philosophical and religious. The Fountain, and Other Poems (1842), The White-footed Deer, and Other Poems (1844), and many original and collected works, show his power as a writer. A festival was given in his honor at the Century Club (1864), and in 1876 he was presented with a silver vase, a token of the esteem of contemporaneous literary admirers. He died June 12, 1878, from the effect of a fall. Bryant's Library of Poetry and Song, and his Illustrated History of the United States, are well-known publications.

Bubas' tis, an ancient Egyptian town, so named from the goddess Bast, supposed to answer to the Greek Artěmis, or Diana. The cat was sacred to her, and the Bubasteia or festivals of the goddess were the largest and most important of the Egyptian festivals.

Buccaneers', a name derived from Carib boucan, a place for smoking meat, first given to European settlers in Hayti, or Hispaniola, whose business was to hunt wild cattle and swine and smoke their flesh. In an extended sense it was applied to English and French adventurers, mostly seafaring people, who, combining for mutual defense against the arrogant pretensions of the Spaniards to the dominion of the whole of America, frequented the West Indies in the seventeenth century, acquired predatory and lawless habits, and be-came ultimately, in many cases, little better than pirates. The earliest association of these adventurers began about 1625 but they afterward became much more formidable, and continued to be a terror until the opening of the eighteenth century, inflicting heavy losses upon the shipping trade of Spain, and even atwere Montbars (II exterminador), Peter the Great of Dieppe. L. Olonnas, de Busco, Van Horn, and the Welshman Henry Morgan, who, in 1670, marched across the isthmus, plundered Panama, and after being knighted by Charles II, became deputy governor of Jamaica. The last great exploit of the buccaneers was the capture of Carthagena in 1697, after which they are lost sight of in the annals of vulgar piracy.

**Bučcinator** (buk-si-nā'ter), the trumpeter's muscle, a flat, thin muscle forming the wall of the cheek, assisting in mastication and regulating the expulsion of the air in whistling or playing a wind-instrument.

**Bucen' taur**, a mythical monster, half man and half ox. The splendid galley in which the doge of Venice annually wedded the Adriatic bore this name.

**Buceph' alus** ("Ox-head"), the horse of Alexander the Great. On its death from a wound Alexander built over its grave, near the Hydaspes. a city called Bucepala.

**Bucer** (bu 'tser), MARTIN (1491-1551), a sixteenth century reformer, whose real name was Kuhhorn (cow-horn), of which *Bucer* is meant

# Buch

to be the Greek equivalent. In 1521 he left the Dominican order and became preacher at the court of the Elector Frederick, and afterward in Strasburg, where he was professor in the university for twenty years. In 1548 Edward VI invited him to Cambridge, where he held the office of professor of theology, and died in 1551. In 1557 Queen Mary caused his bones to be burned. Cardinal Contarini called him the most learned divine among the heretics.

Buch (buh), LEOFOLD VON (1774-1853), a German geologist. He made extensive geological excursions on the continent of Europe, and also visited the Canary Islands, the Hebrides, and the coasts of Scotland and Ireland. He was the author of various important works; and compiled a magnificent geological map of Germany.

Buchan (buk'an or bu'han), WILLIAM (1729-1895), a Scotch medical writer, studied at Edinburg, and commenced practise there, where also he published in 1769 his work entitled *Domestic Medicine; or the Family Physician*—the first work of the kind published in Britain. Before his death, nineteen large editions had been sold. It was translated into French, and became even more popular on the Continent and in America than at home.

Buchanan, JAMES (1791-1868), fifteenth president of the U.S., b. in Pennsylvania; son of an Irishman who had quitted Europe in 1783. James Buchanan was educated at Dickinson College, Carlisle; was admitted to the bar in 1812; was elected to the legislature of Pennsylvania in 1814; in 1820 was elected to Congress, of which he continued a member till 1831. After having been sent to Russia to conclude a commercial treaty he was in 1834 elected to the Senate, and under the presidency of Polk (1845-49) was appointed secretary of state. During the presidency of General Taylor he retired from public life, but in 1853 General Pierce, who was then president, named him ambassador of the U. S. at London. He returned to America in 1856 as Democratic candidate for the presidency, and was elected by a large majority over Fremont, the Republican candidate, and inaugurated in March, 1857. By his pro-slavery views Buchanan succeeded in delaying the storm which burst out on the election of his successor Lincoln. He lived in retirement after the close of his administration (1861), of which he published an account two years before his death.

Buchanan, ROBERT WILLIAM, b. 1841, English poet and author, was educated at the University of Glasgow. He was for many years a writer for the *Contemporary Review*, has published several novels and some good poetry, and wrote the plays of *Alone in London* and *Sophia*.

**Buck-bean**, Bog-bean, or Marsh-trefoil, a beautiful plant of the order of Gentianaceæ, common in spongy, boggy soils, and found in Britain, throughout Europe, in Siberia, and in North America. It is from 6 to 12 in. in height, and flowers in Britain about the latter end of June, the flower stalk terminating

#### Buckingham

in a thyrse of white flowers, while the inner surface of the corolla has a coating of dense fleshy hairs. The whole plant, the root espe-



Buck-bean a.-fruit; b.-flower.

cially, has an intensely bitter taste, and formerly ranked highly as a tonic.

Buck, ALFRED E., b. at Foxcroft, Me., 1832, graduated at Waterville College, now Colby University, 1859, after which he taught school for two years. When the war broke out he applied for enlistment but was refused. Later he raised a company at his own expense and was made captain. In 1863 he organized the Ninty-first Regiment of colored infantry and became its lieutenant-colonel. The following year he was made lieutenant colonel of the Fifty-first colored infantry, which position he held until he was mustered out in 1866. He then settled in Alabama where he held several political offices, being elected to Congress in 1869. He then moved to Atlanta, Ga., and was a member of the Georgia delegation to the Republican National conventions of 1880, 1884, In 1882 he was chairman of the Georand 1888. gia State Central Committee and became U.S. He was appointed in 1897 minister marshal. to Japan by President McKinley.

Buck, DUDLEY (1839-1897), American musical composer, b. at Hartford, Conn. He studied in Leipsic, Dresden, and Paris, settled in Chicago for several years, then became organist of Boston Music Hall, and afterward of Trinity Church, Boston. He wrote a cantata, which was performed under the direction of Theodore Thomas at the inauguration of the Centennial exhibition of 1876, and was the author of some popular operettas and several compositions for the organ.

Buckeye, an American name for certain species of horse-chestnuts.

Buck' ingham (or Bucks), an inland county, England: area about 730 sq. mi. The breeding and fattening of cattle and pigs are largely carried on, also the breeding of horses, and much butter is made. The manufactures are unimportant, among them being straw-plaiting, thread lace, and the making of wooden articles, such as beechen chairs, turnery, etc. Pop. 185.190. BUCKINGHAM, the co. town, is pleasantly situated on a peninsula formed by the Ouse. Malting and tanning are carried on, and some lace is made. Pop. 3,364.

Buck' ingham, GEORGE VILLIERS, Duke of

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# **Buckingham Palace**

(1592-1628), favorite of James I and Charles I of England. At eighteen he was sent to France where he resided three years, and on his return made so great an impression on James I that in two years he was made a knight, a gentleman of the bed-chamber, baron, viscount, Marquis of Buckingham, lord highadmiral, etc., and at last dispenser of all the honors and offices of the three kingdoms. In 1623 when the Earl of Bristol was negotiating a marriage for Prince Charles with the Infanta of Spain, Buckingham went with the prince incognito to Madrid to carry on the suit in person in the hope of securing the Palitinate as a dowry. The result, however, was the breaking off of the marriage, and the declaration of war with Spain. During his absence Buckingham was created duke. After the death of James in 1625 he was sent to France as proxy for Charles I to marry the Princess Henrietta Maria. In 1626 after the failure of the Cadiz expedition, he was impeached, but saved by the favor of the king. Despite the difficulty in obtaining supplies Buckingham took upon himself the conduct of a war with France, but his expedition in aid of the Rochellese proved an entire failure. In the meantime the spirit of revolt was becoming more formidable; the Petition of Right was carried despite the duke's exertions, and he was again protected from impeachment only by the king's prorogation of Parliament. He then. went to Portsmouth to lead another expedition to Rochelle, but was stabbed by John Felton. an ex-lieutenant who had been disappointed of promotion.

Buckingham Palace, a royal palace in London, facing St. James's Park, built in the reign of George IV, and forming one of the residences of Queen Victoria.

Buck land, FRANCIS TREVELVAN (1826-1880). English naturalist. From 1848 to 1851 he was a student, and from 1852 to 1853 house surgeon at St. George's Hospital. He became assistant surgeon in the Second Life Guards in 1854. On the establishment of the *Field* newspaper in 1856, he joined the staff, writing for it until 1865. In 1866 he commenced a weekly journal of his own, Land and Water, and in 1867 was appointed an inspector of salmon fisheries. His best known books are his *Curiosities of* Natural History (4 vols. 1857-72), the Logbook of a Fisherman and Zoologist (1875), and the Natural History of Fishes (1881).

Buckle, GEORGE EARLE, b. 1854, British journalist: won the Newdigate prize at Oxford, 1875, and graduated in 1876, and M. A. in 1879. He was a fellow of All Souls' College, 1877-85, and in 1884 became editor of the London Times.

Buckle, HENRY THOMAS (1822-62), English historical writer. At the age of eighteen he devoted himself entirely to study. His chief work, a philosophic *History of Civilization*, of which only two volumes were completed, was characterized by much novel and suggestive thought, and by the bold co-ordination of a vast store of materials drawn from the most varied sources. Three volumes of his miscellaneous and posthumous works were edited by Helen Taylor in 1872. He d. while traveling. at Damascus.

Buckner, SIMON BOLIVAR, an American soldier, b. 1823, in Hart co., Ky. He was educated at West Point, and served with distinction in the Mexican War. He joined the Confederacy in August, 1861, and surrendered Fort Donelson, Feb. 16, 1862. He afterward commanded a division at Chattanooga, and an army corps at Chickamauga. On May 26, 1865, he surrendered the last army corps of the Confederates to General Canby, of the Federal army. In 1896 he was a candidate for the vicepresidency on the Democratic sound-money ticket with Senator Palmer of Illinois.

Buck' thorn, the name of an extensive genus of trees and shrubs, order Rhamnaceæ. Several species belong to North America. The common buckthorn, a British and North American shrub, grows to 7 or 8 ft., has strong



Alder Buckthorn.

spines on its branches, elliptical and serrated leaves, male and female flowers on different plants, a greenish-yellow calyx, no corolla, and a round, black berry. It flowers in May. The berries are purgative, but harsh in action. The bark yields a yellow dye, the berries sap green. Dyer's buckthorn yields French or yellow berries.

Buck' wheat (or Brank), a plant of the order Polygoneæ, with branched herbaceous stem, somewhat arrow-shaped leaves, and purplishwhite flowers growing to the height of about 30 in. and bearing a small triangular grain, of a brownish black without and white within. The shape of its seeds gives it its German name buchneeizen, "beech-wheat" whence the English name. The plant was first brought to Europe from Asia by the Crusaders, and hence in France is often called Saracen corn.

It grows on the poorest soils. It is cultivated in China and other eastern countries as a bread-corn. In Europe buckwheat has been principally cultivated as food for oxen, swine and poultry; but in Germany it serves as an ingredient in pottage, puddings, and other food, and in America buckwheat cakes are esteemed a great delicacy.



**Bucyrus,** Crawford co., O., on Sandusky river, 63 mi. n. from Columbus. Railroads: P., Ft. W. & St. L. division of Pa. Ry., T. & O. C., C. S. & H. Industries: brick and tile factory, three flouring mills, three iron foundries, one woolen mill, furniture factory, plow factory, and others. Surrounding country agricultural. Bucyrus became a city in.1885. Colonel Crawford fought his last battle with the Indians in this county. Pop. est. 1897, 7,500.

Bud, the name of bodies of various form and structure, which develop upon vegetables, and contain the rudiments of future organs, as stems, branches, leaves, and organs of fructification. Upon exogenous plants they are in their commencement cellular prolongations from the medullary rays, which force their way through the bark. In general, a single bud is developed each year in the axil of each leaf, and there is one terminating the branch called a terminal bud. The life of the plant during winter is stored up in the bud as in an embryo, and it is by its vital action that on the return of spring the flow of sap from the roots is stimulated to renewed activity. Buds are distinguished into leaf-buds and flower-The latter are produced in the axil of buds. leaves called floral leaves or bracts. The terminal bud of a branch is usually a flower-bud, and as cultivation is capable of producing flower-buds in place of leaf-buds, the one is probably a modification of the other.

Budapest (-pesht'), the official name of the united towns of Pest and Buda (or Ofen), the one on the right, the other on the left. of the Danube, forming the capital of Hungariy, the seat of the imperial diet of the Hungarian ministry and of the supreme court of justice. Buda, which is the smaller of the two, and lies on the west bank of the river, consists of the fortified Upper Town on a hill; the Lower Town (or Wasserstadt) at the foot of the hill, and several other districts. Among the chief buildings are the royal castle and several

# Buddhism

palaces, the arsenal, town hall, government offices, etc., and the finest Jewish synagogue The mineral baths of Buda in the empire. have long been famous, the Bruckbad and Kaiserbad having both been used by the Ro-mans. Pest, or the portion of Budapest on the left or east bank of the river, is formed by the inner town of Old Pest on the Danube, about which has grown a semicircle of districts-Leopoldstadt, Theresienstadt, Elizabethstadt, etc. In commerce and industry Budapest ranks next to Vienna in the empire. Its chief manufactures are machinery. gold, silver, copper, and iron wares, chemicals, silk, leather, tobbaco, etc. A large trade is done in grain, wine, wool, cattle, etc. Budapest is strongly Magyar, and as a factor in the national life may almost be regarded as equivalent to the rest of Hungary. It was not until 1799 that the population of Pest began to outdistance that of Buda; but from that date its growth was very rapid and out of all proportion to the increase of Buda. In 1709 the joint population of the two towns was little more than 50,000; in 1886 it was 411,917.

Buddha (bud'ha; "the Wise" or "the Enlightened"), the sacred name of the founder of Buddhism, an Indian sage who appears to have lived in the fifth century B. C. His personal name was Siddhartha, and his family name Gautama; and he is often called also Sakya-muni (from Sakya, the name of his tribe, and muni, a Sanskrit word meaning a sage). His father was king of Kapilavastu, a few days' journey north of Benares. Siddhartha, filled with a deep compassion for the human race, left his father's court, and lived for years in solitude till he had penetrated the mysteries of life, and become the Buddha. He then began to teach his new faith, in opposition to the prevailing Brahmanism, commencing at Benares. Among his earliest converts were the monarchs of Magadha and Kosala, in whose kingdoms he chiefly passed the latter portion of his life, respected, honored, and protected. See Buddhism.

Buddhism, the religious system founded by Buddha, one of the most prominent doctrines of which is that Nirvana, or an absolute release from existence, is the chief good. According to it pain is inseparable from existence, and consequently pain can cease only through Nirvana; and in order to attain Nirvana our desires and passions must be suppressed, the most extreme self-renunciation practised, and we must, as far as possible, forget our own personality. In order to attain Nirvâna eight conditions must be kept or practised. The first is in Buddhistic lanpractised. guage right view; the second is right judgment; the third is right language; the fourth is right purpose; the fifth is right profession; the sixth is right application; the seventh is right memory; the eighth is right meditation. The five fundamental precepts of the Buddhist moral code are: not to kill, not to steal, not to commit adultery, not to lie, and not to give way to drunkenness. To these there are added five others of less importance, and binding more

particularly on the religious class, such as to abstain from repasts taken out of season, from theatrical representations, etc. There are six fundamental virtues to be practised by all men alike; viz., charity, purity, patience, courage, contemplation, and knowledge. These are the virtues that are said to "conduct a man-to the other shore." The devotee who strictly practises them has not yet attained Nirvana, but is on the road to it. The Buddhist virtue of charity is universal in its application, extending to all creatures, and demanding sometimes the greatest self-denial and sacrifice. There is a legend that the Buddha in one of his stages of existence (for he had passed through innumerable transmigrations before becoming "the enlightened") gave himself up to be devoured by a famishing lioness which was un-able to suckle her young ones. There are other virtues, less important, indeed, than the six cardinal ones, but still binding on believers. Thus not only is lying forbidden, but evil-speaking, coarseness of language, and even vain and frivolous talk, must be avoided. Buddhist metaphysics are comprised in three theories-the theory of transmigration (borrowed from Brahmanism), the theory of the mutual connection of causes, and the theory of Nirvâna. The first requires no explanation. According to the second, life is the result of twelve conditions, which are by turns causes and effects. Thus there would be no death were it not for birth; it is therefore the effect of which birth is the cause. Again, there would be no birth were there not a continuation of existence. Existence has for its cause our attachment to things, which again has its origin in desire; and so on through sensation, contact, the organs of sensation and the heart, name and form, ideas, etc., up to This ignorance, however, is not ignorance. ordinary ignorance, but the fundamental error which causes us to attribute permanence and reality to things. This, then, is the primary origin of existence and all its attendant evils. Nirvâna, or extinction, is eternal salvation from the evils of existence, and the end which every Buddhist is supposed to seek. Sakya-muni did not leave his doctrines in writing; he declared them orally, and they were carefully treasured up by his disciples, and written down after his death. The determination of the canon of the Buddhist scriptures as we now possess them was the work of three successive councils, and was finished two centuries at least before Christ. From Buddhism involving a protest against caste distinctions it was eagerly adopted by the Dasyus or non-Aryan inhabitants of Hindustan. It was pure, moral, and humane in its origin, but it came subsequently to be mixed up with idolatrous worship of its founder and other deities. Although now long banished from Hindustan by the persecutions of the Brahmans, Buddhism prevails in Ceylon, Burmah, Siam, Anam, Thibet, Mongolia, China, Java, and Japan, and its adherents are said to comprise about a third of the human race.

Budding, the art of multiplying plants by

causing the leaf-bud of one species or variety to grow upon the branch of another. The operation consists in shaving off a leaf-bud, with a portion of the wood beneath it, which portion is afterward removed by a sudden jerk of the operator's finger and thumb, aided by the budding-knife. An incision in the bark of the stock is then made in the form of a T; the two side lips are pushed aside, the bud is thrust between the bark and the wood, the upper end of its bark is cut to a level with the cross arm of the T, and the whole is bound up with worsted or other soft fastening, the point of the bud being left exposed. In performing the operation, a knife with a thin flat handle and a blade with a peculiar edge is required. The bud must be fully formed; the bark of the stock must separate readily from the wood below it; and young branches should always be chosen, as having beneath the bark the largest quantity of cambium, or viscid matter, out of



a.-the bud cut out; b.-the stock; c.-the bud inserted.

which tissue is formed. The maturer shoots of the year in which the operation is performed are the best. The autumn is the best time for budding, though it may also be practised in the spring.

Bude Light, an exceedingly brilliant light, invented by Mr. Gurney of Bude, Cornwall, England, and produced by directing a current of oxygen into the interior of the flame of an argand-lamp or gas-burner.

**Buell**, DON CARLOS (1818-), American sol-dier, b. at Marietta, O. He graduated at the U. S. military academy in 1841, became first lieutenant, third infantry, 1846, and won the brevet of captain at Monterey, and that of major at Contreras and Churubusco, where he was wounded. From 1849-61 he was at the headquarters of various departments. On May 11, 1861, he was made a lieutenant colonel and appointed brigadier general of volunteers May 17, 1861. After organizing troops in Washington he was assigned to a division in the army of the Potomac, which became noted for its discipline. He succeeded Gen. W. T. Sherman in the department of the Cumberland. On March 21, 1862, he was made major general of volunteers. By the aid of his division, which arrived at Shiloh, April 6, the Confederates, under General Beauregard, were driven to Corinth. On June 12, 1862, he assumed command of the district of Ohio. On September 30, by order from Washington, General Buell gave up his command to Gen. G. H. Thomas, but he was restored on the same day. A courtmartial was held and Buell was acquitted. Andrew Johnson, then military governor of Tennessee, protested against his ever holding duty in that state, and he was transferred to the department of the Gulf. He declined this command, and resigned. He was mustered out of the volunteer service May 23, 1864. He subsequently held the post of pension agent at Louisville, Ky.

Buenos Ayres (bu-en'ôs ī'rās), a city of South America, capital of the Argentine Republic. It was founded in 1535 by Don Pedro de Mendoza, and is built with great regularity, the streets uniformly crossing each other at right angles. It contains the palace of the president, the house of representatives, a townhall, a number of hospitals and asylums, a cathedral, several monasteries, nunneries, and Catholic and Protestant churches, and several theaters, a university, and a customhouse. The university, founded in 1821, is attended by about 800 students. There are also a medical school, normal and other schools, besides liter-ary and scientific societies. There is no harbor, and large vessels can only come within 8 or 9 miles of the town, but extensive harbor works have been begun. The nearest good harbor is at La Plata, a new town 30 miles lower down the estuary, and now (since 1884) the capital of the province. Buenos Ayres is one of the leading commercial centers of South America, its exports and imports together annually amounting to over \$60,000,000. Chief exports are ox and horse hides, sheep and other skins, wool, tallow, horns, etc. There are 6 railways running from the city, and 100 miles of tramway in the city and suburbs. About one-fourth of the inhabitants are whites; the rest are Indians, negroes, and mixed breeds. Pop. 581,276. The province of Buenos Avres has an area of about 63,000 sq. mi., and presents nearly throughout level or slightly undulating plains (pampas), which afford pasture to vast numbers of cattle and wild horses. These constitute the chief wealth of the inhabitants. Pop. 1,411,160.

**Buf falo**, an ungulate or hoofed ruminant mammal, family Bovidæ, or oxen, the bestknown species of which is the common or Indian buffalo. larger than the ox and with



The Oape Buffalo.

stouter limbs, originally from India, but now found in most of the warmer countries of the Eastern Continent. A full grown male is a bold and powerful animal, quite a match for the tiger. The buffalo is less docile than the common ox, and is fond of marshy places and rivers. It is, however, used in tillage, draught, and carriage in India, Italy, etc. The female gives much more milk than the cow, and from the milk the ghee, or clarified butter, of India is made. The hide is exceedingly tough, and a valuable leather is prepared from it, but the flesh is not very highly esteemed. Another Indian species is the arnee, the largest of the ox family. The Cape Buffalo is distinguished by the size of its horns, which are united at their bases, forming a great bony mass on the front of the head. It attains a greater size than an ordinary ox. The name is also applied to wild oxen in general, and particularly to

the bison of North America. See Bison. Buf'falo, a city of New York, at the e. extremity of Lake Erie, the mouth of the Buffalo River, and the head of the Niagara River. It has a water front of 21 mi. on the lake and of the same extent on the Niagara River, which is here crossed by an iron bridge. The position of Buffalo on the great water and railway channels of communication between the West and the East makes it the center of a vast trade in grain, live stock, and other commodities. The harbor is capacious, and is protected by extensive breakwaters. The Eric Canal, which connects with the Hudson, has its western terminus here. The whole site is a plain with a gentle descent toward the lake, well covered with houses, except where open spaces or squares have been left for ornament and ventilation. There is a splendid public park. The principal buildings are the city and county hall, the customhouse and postoffice. the arsenal, and many of the churches; other buildings and institutions of note are: a young men's literary association with a library of above 40,000 volumes, an orphan asylum, a general hospital, and a fine cemetery covering about 76 acres. Manufactures are numerous and varied, consisting of machinery and iron goods, agricultural implements, leather, etc. Pop. 255.664.

**Buffalo-berry**, a shrub of the oleaster family, a native of the U. S. and Canada, with lanceolate silvery leaves and close clusters of bright red acid berries about the size of currants, which are made into preserves and used in various ways.

Buffalo-grass, a strong-growing North American grass, so called from once forming a large part of the food of the buffalo. It is very nutritious. The blades of this grass are about six inches long. In the springtime it grew very luxuriantly, and when burned by the summer sun became crisp, curly, and light brown in color. It grew best in the buffalo wallows—round depressions about a foot deep which marked the sleeping place of the bison.

Buff Leather, a sort of leather prepared from the skin of the buffalo and other kinds of oxen, dressed with oil, like chamois. It is used for



making bandoliers, belts, pouches, gloves, and other articles.

**Buffon** (bu-fön), GEORGE LOUIS LECLERC, Count de (1707-1788), celebrated French naturalist, b. at Montbard, in Burgundy. In 1739 he was appointed superintendent of the Royal Garden at Paris (now the Jardin des Plantes), and devoted himself to the great work on *Natural History*, which occupied the most of his life.

**Bug**, otherwise known as the house-bug or bed-bug. The common bug is about  $\frac{1}{16}$ inch long, wingless, of a roundish depressed body, dirty, rust color, and emits an offensive smell when touched. The female lays her eggs in summer in the crevices of bedsteads, furniture, and walls of rooms. Its larvæ are small, white, and semi-transparent. They attain full size in eleven weeks. The mouth of the bug has a three-jointed proboscis, which forms sheath for a sucker. It is fond of human blood, but eats various other substances. The name was formerly applied loosely to insects of various kinds, and in the U. S. it is generally used where *beetle* would be used in England.

Bugeaud (bu-zho), THOMAS ROBERT, Duke d'Isly (1784-1849), a marshal of France. He entered the army in 1804 as a simple grenadier, but rose to be colonel before the fall of Napoleon. After the revolution of 1830 he obtained a seat in the Chamber of Deputies. He was afterward sent to Algeria, where he gained many advantages over the Arabs. On the revolution of 1848 he adhered to Louis Philippe to the last. Under the presidency of Louis Napoleon he was appointed commanderin-chief of the army of the Alps.

Bugenhagen (bö'gen-hi-gen), JOHANN (1485-1558), German reformer, friend and helper of Luther in preparing his translation of the Bible. He effected the union of the Protestant free cities with the Saxons, and introduced into Brunswick, Hamburg, Lübeck, Pomerania, Denmark, and many other places, the Lutheran service and church discipline. He translated the Bible into Low German, wrote an Exposition of the Book of Psalms and a History of Pomerania.

**Buggy**, a name given to several species of carriages or gigs; in England, a light one-horse two-wheeled vehicle without a hood; in the U. S., a light one-horse four-wheeled vehicle, with or without a hood or top; in India, a gig with a large hood to screen those who travel in it from the sun's rays.

**Buhl-work** (böl'-), a description of inlaid work, said to have been invented by Boule, a French cabinetmaker, in the reign of Louis XIV. It consisted at first of unburnished gold, brass, enamel, or mother-of-pearl worked into complicated and ornamental patterns, and inserted in a ground of dark-colored metal, wood, or tortoise shell; but at a later period the use of wood of a different color was introduced by Reisner, and to his process the modern practise of buhl-work is chiefly confined.

**Buhrstone** (bör'-) (Burrstone), a name given to certain siliceous or siliceo-calcareous stones, whose dressed surfaces present a burr or keencutting texture, whence they are much used for millstones. The most esteemed varieties are obtained from the upper fresh-water beds of the Paris basin, and from the Eocene strata of South America.

Building Lease, a lease of land for a long term of years, usually 90 years, at a rent called a ground rent, the lessee covenanting to erect certain edifices thereon, and to maintain the same during the term. At the expiration of the lease the houses built become the absolute property of the landlord.

Building Societies, joint-stock benefit societies for the purpose of raising by periodical subscriptions a fund to assist members in obtaining small portions of landed property and houses, which are mortgaged to the society till the amount of the shares drawn on shall be fully repaid with interest. These societies may be divided into two sections: the Pro-The prietary and the Mutual Societies. former class takes money on deposit, paying a somewhat higher rate of interest than can generally be had on money available at call. and gives loans for building purposes, or the like, repayable by installments. The profit of the company lies in the difference between the rate charged to borrowers and the rate paid to depositors. The mutual societies are of two chief kinds, either limited to a certain term of years and confined to a certain number of members, or permanent and not confined to any definite number of members, but ready to receive new members as long as the society exists and to issue at stated intervals new series of stock. A favorite form of terminating a society allots its capital among the members, according to the number of shares they hold, by ballot. The subscriptions are paid weekly or monthly, and on securing a loan the member repays this sum very much as he would pay his rent, over a term of years. When his payments and accrued profits amount to the face value of the stock, he surrenders his stock and the house or land becomes his own. Terminable societies are giving place to the permanent kind. These, by the constant admission of new members, have a constant supply of funds at their disposal, and are thus able to supply the demands of all the borrowers; while the security offered to investors induces many people to enter the society merely with the view of having a convenient means of depositing their savings, and not with the intention of acquiring any real prop-erty for themselves. The states usually have strict laws governing such institutions, and examiners to see that they are enforced.

Bukarest', the capital of Roumania, situated on the Dimbovitza about 33 mi. n. of the Danube, in a fertile plain. It is in general poorly built, among the chief buildings being the Royal Palace, the National Theater, the university buildings, the National Bank, the Mint, and the Archiepiscopal church. There are handsome public gardens. Manufactures are varied but unimportant; the trade is considerable, the chief articles being grain, wool, honey, wax, wine, hides. The mercantile portion of the community is mostly foreign, and the whole population presents a curious blending of nationalities. Bukarest became the capital of Wallachia in 1665, in 1802 that of the united principalities of Wallachia and Moldavia. A treaty was concluded here in 1812 between Turkey and Russia by which the former ceded Bessarabia and part of Moldavia. Pop. about 220,000.

**Bukowina** (bö koo-vē'nà), an Austrian duchy forming the southeastern corner of Galicia. Area 4,035 sq. mi., pop. 571,671. It is traversed by ramifications of the Carpathians, and much of the surface is occupied with swamps and forests. Chief town, Czernowitz.

**Bualacan'**, a town, Philippines, island of Luzon, about 22 mi. n.w. of Manilla; chief industries: sugar-boiling and the manufacture of silken mats. Pop. about 10,000.

Bulb, a modified leaf-bud, formed on a plant upon or beneath the surface of the ground, emitting roots from its base, and producing a stem from its center. It is formed of imbricated scales or of concentric coats or layers. It encloses the rudiments of the future plant and a store of food to nourish it. Examples of bulbs are the onion, lily, hyacinth, etc.

**Bulbul** (bul'bul), the Persian name of the nightingale, or a species of nightingale, rendered familiar in English poetry by Moore,



a.-Truncated bulb of onion; b.-onion leaf dissected off; c.-bulb of llly.

Byron, and others. The same name is also given in Southern and Southwestern Asia to sundry other birds.

Buiga' ria, a principality tributary to Turkey, constituted by the first article of the Treaty of Berlin, July 13, 1878, and placed under the suzerainty of the sultan. It is bounded n. by Roumania and the Dobrudsha, e. by the Black Sea, s. by the Balkan Mountains, which separate it from Eastern Roumelia, and w. by Servia. The principal towns are Widdin, Sofia, Plevna, Sistova, Tirnova, Rustchuk, Shumla, Varna, and Silistria. The country almost wholly belongs to the n. slope of the Balkans, and is intersected by streams flowing from that range to the Danube. It possesses much good agricultural land and a good climate; but cul-

### **Bulkheads**

tivation is backward, though the rearing of cattle and horses is successfully carried on. Agricultural produce is exported, manufactured goods imported. Education is backward, but improving; four years' school attendance is obligatory in principle. The prevalent religion is that of the Greek Church. The revenue and expenditure are each about \$5,945,000. Military service is obligatory; the war strength of the army is about 100,000. In accordance with the terms of the treaty of Berlin a constitution was drawn up for the new principality by an assembly of Bulgarian notables at Tirnova, in 1879. By this constitution the legislative authority is vested in a single chamber, called the Sobranje, or National Assembly, the members of which are partly elected by universal manhood suffrage, partly nominated by the prince. On April 29, 1879, Prince Alexander of Battenberg, cousin of the grand duke of Hesse, was elected prince by unanimous vote of the constituent assembly. In 1885 a national rising took place in Eastern Roumelia, the Turkish governor was expelled, and union with Bulgaria proclaimed. In consequence Servia demanded an addition to her own territory, and began a war against Bulgaria (November, 1885), in which she was severely de-feated. By the treaty following, the prince of Bulgaria was appointed governor general of Eastern Roumelia for a term of five years, to be renominated at the end of that time by sanction of the great powers. These events greatly irritated Russia, whose agents managed to seduce certain regiments of Bulgarians; and in August, 1886, the prince was seized and carried off, while a proclamation was issued to the effect that he had abdicated. When he was set free on Austrian territory he discovered that the people were still with him, and determined to return. Seeing, however, that his presence would cause an immediate interference on the part of Russia, he formally abdicated and left the country (Sept. 7, 1886). In 1887 Prince Ferdinand of Saxe-Coburg accepted an invitation to occupy the throne; but his position is insecure, as the great powers have not sanc-tioned the step taken by him. The area of Bulgaria proper is about 24,400 sq. mi.; pop. 3,154,375. Eastern Roumelia has an **area of** 13.-500 sq. mi.; a pop. of over 975,000.

Bulgarians, a race of Finnish origin, whose original seat was the banks of the Volga, and who subdued the old Mæsian population and established a kingdom in the present Bulgaria in the seventh century. They soon became blended with the conquered Slavs, whose language they adopted. In the fourteenth century the country was conquered by the Turks, and has until lately remained part of the Ottoman Empire. (See Bulgaria.) The Bulgarian lan-Empire. (See Bulgaria.) guage is divided into two dialects, the old and the new; the former is the richest and best of the Slavonic tongues, and although extinct as a living tongue is still used as the sacred language of the Greek Church. The Bulgarians are now spread over many parts of the Balkan Peninsula.

Bulkheads, partitions built between the

several portions of the interior of a ship, either to separate it into rooms, or as a safeguard in case of wreck.

Buil, a letter, edict, or rescript of the pope, published or transmitted to the churches over which he is head, containing some decree, order, or decision, and in many cases having a leaden seal attached, impressed on one side with the heads of St. Peter and St. Paul, on the other with the name of the pope. The document is in Latin and on parchment.

Buil, JOHN, the English nation personified, hence any typical Englishman; first used in Arbuthnot's satire, *The History of John Bull*, designed to ridicule the Duke of Marlborough, and in which the French are personified as *Lewis Baboon*, the Dutch as *Nicholus Frog*, etc.

Buil, OLE BORNEMANN (1810-1880), famous violinist, b. at Bergen, in Norway. He secured great triumphs both throughout Europe and in America by his wonderful playing. He lost all his money in a scheme to found a colony of his countrymen in Pennsylvania, and had to take again to his violin to repair his broken fortunes. He afterward settled down at Cambridge, Mass., and had also a summer residence in Norway, where he died.

Buildog, a variety of the common dog, remarkable for its short, broad muzzle, and

the projection of its lower jaw, which causes the lower front teeth to pro-trude beyond the upper. The head is massive and broad; the lips are thick and pendulous; the ears pendent at the extremity; the neck robust and short: the body long and stout; and the legs short and thick. The bulldog is a slow-motioned ferocious animal, better



suited for savage combat than for any purpose requiring activity and intelligence. For this



Bulldog.

reason it is often employed as a watchdog. It was formerly used—as its name implies for the barbarous sport of bull-baiting. The *bull terrier* was originally from a cross between the bulldog and the terrier. It is smaller than the bulldog, lively, docile, and very courageous.

**Bullet** (bul'et) a projectile intended to be discharged from firearms or other missile weapons; more especially, one for a rifle, musket, fowling piece, pistol, or similar firearm. Bullets used to be solid spherical masses, but of late many changes have been made on their shape and structure. Bullets used for rifles of recent construction are elongated and generally rounded, conical, or ogival at the apex, somewhat like half an egg drawn out, often with a hollow at the base, into which a plug of wood or clay is inserted. When the rifle is fired the plug is driven forward, forcing the base of the bullet outward till the lead catches the grooves of the barrel.

**Bulletin** (bul'e-tin), an anthenticated official report concerning some public event, such as military operations, the health of a distinguished personage, issued for the information of the public. The name is also given to some periodical publications recording the proceedings of learned societies.

**Bullet tree** (or bully tree), a forest tree of Guiana and neighboring regions, yielding an excellent gum (the concreted milky juice) known as *balata*, having properties giving it in some respects an intermediate position between gutta-percha and india rubber, and making it for certain industrial purposes more useful than either. In the U.S. it is used as a chewing material. The timber of the tree also is valuable.

**Builfights** are among the favorite diversions of the Spaniards. They are usually held in an amphitheater having circular seats rising one above another, and are attended by vast crowds who eagerly pay for admission. The combatants, who make bullfighting their profession, march into the arena in procession. They are of various kinds-the picadores, combatants on horseback, in the old Spanish knightly garb; the chulos, or banderilleros, combatants on foot, in gay dresses, with colored cloaks or banners; and lastly, the metador (the killer). As soon as the signal is given the bull is let into the arena. The picadores, who have stationed themselves near him, commence the attack with their lances, and the bull is thus goaded to fury. Sometimes a horse is wounded or killed (only old worthless animals are thus employed), and the rider is obliged to run for his life. The *chulos* assist the horsemen by drawing the attention of the bull with their cloaks; and in case of danger they save themselves by leaping over the wooden fence which surrounds the arena. The banderilleros then come into play. They try to fasten on the bull their banderillos—barbed darts ornamented with colored paper, and often having squibs or crackers attached. If they succeed, the souibs are discharged, and the bull races madly about the arena. The metador, or espada, now comes

# Bullfinch

in gravely with a naked sword, and a red flag to decoy the bull with, and aims a fatal blow at the animal. The slaughtered bull is dragged away, and another is let out from the stall. Several bulls are so disposed of in a single day.

Builfinch, an insessorial bird, of the finch family, with short, thick, rounded bill, beak and crown of the head black, body bluish-gray above and bright tile-red below. It occurs in Britain, in the middle and south of Europe, and in Asia, and when tamed may be taught to sing musical airs.

Builfrog, a species of frog found in most parts of the U. S. and Canada, but chiefly abundant in the Southern states. It is of a large size, 5 to 7 in. long. The color is olive green or reddish brown, with large brown or black spots, and with a yellow line along the back. The under surface is yellowish. It receives its name from the remarkable loudness of its voice, heard as a hollow bass in the frog concerts which take place in the evening and all night long in marshy places. Its voice can be distinctly heard at a distance of forty or fifty yards. It sits for hours during the day, basking in the sun, near the margin of a stream, into which it plunges with a great leap on the least appearance of danger. It does not confine itself to insects and worms like smaller frogs, but eats fish and other frogs, and is said to be partial to young ducks, and to swallow them entire. Its flesh is tender, white, and affords excellent eating, the hind legs, however, being the only part used. These parts make excellent bait for the larger catfish.

**Builhead**, the popular name of certain fishes. One of these, a British fish, is about 4 in. long, with head very large and broader



#### Bullhead.

than the body. It is often called also *Miller's*thumb. The armed bullhead is found in the Baltic and northern seas; the six-horned bullhead is a North American species. In America this name is given to a species called also *Cat*fish and *Horned pout*.

**Bull'ion** is uncoined gold or silver, in bars, plate, or other masses, but the term is frequently employed to signify the precious metals coined and uncoined.

**Bull Run**, a stream in the n.e. of Virginia, flowing into the Occoquan river, 14 mi. from the Potomac; the scene of two great battles during the American Civil War in which the Federals were defeated. The first battle was fought July 21, 1861; and the second on Aug. 30, 1863.

### Buncombe

Buils and Bears, in stock exchange slang, manipulators of stocks; the former operating in order to effect a rise in price, the latter doing all they can to bring prices of stock down.

**Buil's-eye:** 1, a round piece of thick glass, convex on one side, inserted into the decks, ports, scuttle-hatches, or skylight covers of a vessel for the purpose of admitting light. 2, A small lantern with a lens in one side of it to concentrate the light in any desired direction. 3, In *rifle shooting*, the center of a target, of a different color from the rest of it and usually round.

**Bull trout**, a large species of fish of the salmon family, thicker and clumsier in form than the salmon, but so like it as sometimes to be



Bull Trout

mistaken for it by fishers. It attains a weight of 15 to 20 lbs., and lives chiefly in the sea, ascending rivers to spawn. Its scales are smaller than those of the salmon, and its color less bright.

Bülow (bū'lõ), FRIEDRICH WILHELM VON, (1755-1816), Prussian general. He was actively engaged against the French at the earliest periods of the revolutionary war; and his services in 1813 and 1814, especially at Grosbeeren and Dennewitz, were rewarded with a Grand Knightship of the Iron Cross and the title Count Bülow von Dennewitz. As commander of the fourth division of the allied army he contributed to the victorious close of the battle of Waterloo.

Bülow (bü'lö), HANS GUIDO VON (1830-). pianist and composer, born at Dresden; was intended for a lawyer, but adopted music as a profession. He studied the piano under Liszt. and made his first public appearance in 1852. In 1855 he became leading professor in the Conservatory at Berlin; in 1858 was appointed court pianist: and in 1867 he became musical director to the king of Bavaria. His compositions include overture and music to Julius Casar, The Minstrel's Curse, Nirucana; songs, choruses, and pianoforte pieces. He is considered one of the first of pianists and orchestral conductors.

**Buloz** (bü-loz), FRANÇOIS (1803-1877), born near Geneva, Switzerland; founder and editor of the *Revue des Deux Mondes*, the celebrated French fortnightly literary magazine.

**Buirush** (bul'-), the popular name for large, rush-like plants growing in marshes; not very definitely applied.

Buncombe (bunkum), a county in North Carolina. Area 450 sq. mi; pop. 21,910. The



# Bundesrath

term bunkum, meaning talking for talking's sake, bombastic speech-making, is said to have originated with a congressional member for this county, who declared that he was only talking for *Buncombe*, when attempts were made to cut his oratory short.

Bundesrath (bun' des-rät), the German federal council which represents the individual states of the empire, as the Reichstay represents the German nation. It consists of sixtytwo delegates, and its functions are mainly those of a confirming body, although it has the privilege of rejecting measures passed by the Reichstag.

Bungalow, in India, a house or residence, generally of a single floor. Native bungalows are constructed of wood, bamboos, etc., but those erected by Europeans are generally built of sun-dried bricks, and thatched or tiled, and are of all styles and sizes, but invariably surrounded by a veranda.

Bun'ion, an enlargement and inflammation of the joint of the great toe arising from irritation of the small membranous sac.

Bunsen. ROBERT WILHELM EBERARD (1811-), eminent German chemist. He studied at Göttingen University, and at Paris, Berlin, and Vienna; was appointed professor at the Polytechnic Institute of Cassel, 1836; at the University of Marburg in 1838, at Breslau in 1851, and finally professor of experimental chemistry at Heidelberg in 1852. Among his many discoveries and inventions are the production of magnesium in quantities, magnesium light, spectrum analysis, and the electric pile, and the burner which bears his name.

Bunsen's Battery, a form of galvanic battery, the cells of which consist of cleft cylinders of zinc immersed in dilute sulphuric acid, and rectangular prisms of carbon in nitric acid, with an intervening porous cell of unglazed earthenware.

Bunsen's Burner, a form of gas burner espe-



cially adapted for heating, consisting of a tube, in which. by means of holes in the side, the gas becomes mixed with air before consumption. so that it gives a non-illumin at ing smokeless flame.

Bunt (some-

Bunsen's Burner.

times called Smut Ball, Pepper Brand, and Brand Bladders). a fungoid disease incidental to cultivated corn, consisting of a black powdery matter, having a disagreeable odor, occupying the interior of the grain of wheat. This powdery matter con-sists of minute balls filled with sporules, and is caused by the attack of a kind of mold.

Bunt'ing, the popular name of a number of insessorial birds, family Emberizidæ, chiefly included in the genus Emberiza; such as the

### Bunyan

English or common bunting; the rice-bunting; the Lapland, gnow. black-headed, yellow, cirl. and ortolan buntings. The yellow-bunting or yellow-hammer is one of the most common



Reed Bunting.

British birds. The common or corn-bunting is also common in cultivated districts. The snow-bunting is one of the few birds which cheer the solitudes of the polar regions.

Bunker Hill, Charlestown, Mass. One of the most important battles of the Revolution was fought here June 17, 1775. The British army, 10,000 under Generals Gage, Howe, Clinton, and Burgoyne, occupied Boston. The American army, 15,000 strong, enlisted for three months, was commanded by General Ward with headquarters at Cambridge. Learning that the British intended occupying Bunker Hill and the neighboring heights, the Americans stole a march on them and silently, dur-ing the night, fortified Breed's Hill. The British discovering the redoubt at daybreak, opened fire from their ships of war and floating batteries in Charlestown harbor. They landed a force at Morton's Point and advanced upon the position of the Americans, who withheld their fire until they could see the "whites of their enemies' eyes." The British were repulsed with great loss. A second at-tack, during which Charlestown was burned, was no more successful. The British rallied for a third attack, and the Americans, after resisting with stones and the butts of their rifies, having exhausted their ammunition and being destitute of bayonets, drew off with inconsiderable loss. General Warren was among the 115 killed. The Americans lost 305 wounded, and 30 taken prisoners. The loss of the British was about 1,054. June 17, 1825. the fiftieth anniversary of the battle, the corner stone of the Bunker Hill Monument was laid by Lafayette. This monument is a beautiful granite shaft 220 ft. in height. It was completed in 1843.

Bun'yan, JOHN (1628-1688), author of the Pilgrim's Progress, was the son of a tinker and was b. at the village of Elstow, near Bedford. He followed his father's employment, but during the civil war he served as a soldier. Re-

#### Buonarotti

turning to Elstow, after much mental conflict his mind became impressed with a deep sense of the truth and importance of religion. He joined a society of Anabaptists at Bedford, and at length undertook the office of a public teacher among them. Acting in defiance of the severe laws against dissenters, Bunyan was detained in prison for 12 years (1660-72), but was at last liberated, and became pastor of the community with which he had previously been connected. During his imprisonment he wrote Profitable Meditations, The Holy City, etc., and also the curious piece of autobiography entitled Grace Abounding to the Chief of Sinners. In 1675 he was sent to prison for six months under the Conventicle Act. To this confinement he owes his chief literary fame, for in the solitude of his cell he produced the first part of that admired religious allegory, the Pilgrim's Progress. His Holy War, his other religious parables, and his devotional tracts, which are numerous, are also remarkable, and many of them valuable. On obtaining his liberty Bunyan resumed his functions as a minister at Bedford, and became extremely popular. He died when on a visit to London.

Buonarotti (bu-o-nå-rot'tē), sec Michael Angelo (1475-1563).

Bur'bage, RICHARD (1567-1619), famous actor and contemporary of Shakespeare. He was a member of the same company as Shakespeare, Fletcher, Hemming, Condell, and others, and filled all of the greatest parts of the contemporary stage in turn. He was the original Hamlet, Lear, Othello, and Richard III, and played the leading parts in the plays of Beaumont and Fletcher, Ben Jonson, Webster, Marston, etc.

**Bur' bot** (or burbolt), a fish of the cod family, shaped somewhat like an eel, but shorter,



with a flat head. It has two small barbs on the nose and another on the chin. It is called also, *eel-pout* or *coney-fish*, and is said to arrive at its greatest perfection in the Lake of Geneva. It is delicate food. The spotted burbot is found in the American northern lakes and rivers.

**Burckhardt** (burk hart), JOHANN LUDWIG, (1784-1817), a noted traveler. He came to England in 1806, and undertook a journey of exploration to the interior of Africa for the African Association. He started in 1809, assuming an Oriental name and costume: spent some time in Syria, thence visited Egypt and Nubia; spent several months at Mecca, and visited Medina; and after a short stay in Egypt died at Cairo while preparing for his African journey.

Bur'dekin, a river of the n.e. of Queensland. Australia, with a course of about 350

# Burdette

mi. With its affluents it waters a large extent of country, but it is useless for navigation.

Bur'dett, SIR FRANCIS (1770-1844), English politician. In 1796 he entered Parliament as member for Boroughbridge. He afterward sat for Middlesex and in 1807-37 for Westminster. In 1810 he was convicted of breach of privilege, and after a struggle between the police and the populace, in which some lives were lost, he was imprisoned in the Tower. In 1819 he was again imprisoned and fined \$10,000 for a libel. In his later years he became a Tory, and represented North Wilts.

Burdett-Coutts (köts), ANGELA GEORGINA, daughter of the above. b. 1814, has become deservedly popular for the liberal use she has made of the immense wealth she inherited from her grandfather (Thomas Coutts) in public and private charities. In 1871 she received a peerage from government, and in 1881 married a Mr. Ashmead Bartlett who assumed the name of Burdett-Coutts.

**Bur' dock**, the popular name of a coarselooking weed with globose flower-heads, the scales of the involucre each furnished with a



# Greater Burdock.

a.—Section of flower-head showing hooked bracts. hook. In Britain burdocks are regarded as troublesome weeds, but in some countries the roots, young shoots, and young leaves are used in soups, and the plant is cultivated with this view in Japan. It is common in the U.S.

**Bureau** ( $b\bar{u}r\delta'$ ), a writing table; also the chamber of an officer of government and the body of subordinate officers who labor under the direction of a chief. Bureau system, or bureaucracy, is a term often applied to those governments in which the business of administration is carried on in departments, each under the control of a chief; or more broadly, the system of centralizing the administration of a country through regularly graded series of government officials.

Burdette, ROBERT J., b. in Greensboro, Pa., 1844. He attended public school at Pe-

### Burgkmair

oria, Ill., and in 1862 joined the Forty-seventh Illinois volunteers, and served through the war. He wrote for several papers after the war and finally became associate editor of the Burlington *Hawkeye*, of Iowa. He became known as a humorist through this paper. He began to lecture in 1877. He was licensed to preach by the Baptists, and frequently filled pulpits.

**Burgkmair** (burk'mir), a family of German artists in the fifteenth and sixteenth centuries, the best known of whom is Hans (1472-1559). Several of his paintings are to be seen at Augsburg, Munich, Nürnberg, etc., but these have contributed far less to his fame than his woodcuts, which are not inferior to those of his friend Albert Dürer. The most celebrated is the series of 135 cuts representing the Triumph of the Emperor Maximilian.

**Bürglen** (bür'-glen), a village in the canton of Uri, Switzerland, celebrated as the birthplace of William Tell.

Burgos (bür'-gos), a city of Northern Spain, once the capital of the kingdom of Old Castile, and now the chief town of the province of Burgos. It stands on the declivity of a hill on the right bank of the Arlanzon, and has dark, narrow streets full of ancient architecture, but there are also fine promenades in the modern style. The cathedral, commenced in 1221, is one of the finest examples of Gothic architecture in Spain. It contains the tombs of the famous Cid, and of Don Fernando, both natives of Burgos, and celebrated throughout Spain for their heroic achievements in the wars with the Moors. Before the removal of the court to Madrid, in the sixteenth century, Burgos was in a very flourishing condition, and contained thrice its present population. It has some manufactures in woolens and linens. Pop. 29,683. The province has an area of 5,650. sq. mi., largely hilly or mountainous, but with good agricultural and pastoral land. Pop. 348, 152.

**Burgoyne** (bur-goin'), JOHN (1722-1792), an English general officer and dramatist. After serving in various parts of the world, he was in 1777 appointed commander of an army against the American patriots and took Ticonderoga, but had at last to surrender with his whole army at Saratoga. He was illy received on his return to England, and deprived of his command of the Seventy-sixth Light Dragoons and the governorship of Fort William. but Fox and Sheridan took his part and received his parliamentary support. Latterly he occupied himself mainly with the writing of comedies, including *The Maid of the Oaks, Bon Ton*, and *The Heirese*, a play that still Holds the stage.

**Burgoyne**, Sir JOHN FOX (1782-1871), son of the above, an eminent officer of engineers. He served in Malta, Sicily, Egypt, and with Sir John Moore and Wellington in the Peninsula from 1809 to 1814, and was present at all the sieges, generally as first or second in command of the engineers. In 1851 he was made a lieutenant general, and was chief of the engineering department of Sebastopol till recalled in 1855. In the following year he was created a baronet, and in 1868 a field marshal.

# **Burgundy Wines**

**Burgundy**, a region of Western Europe, so named from the Burgundians, a Teutonic, or Germanic, people originally from the country between the Oder and the Vistula. They migrated first to the region of the Upper Rhine, and in the beginning of the fifth century passed into Gaul and obtained possession of the southeastern part of this country, where they founded a kingdom having its seat of government sometimes at Lyons, and sometimes at Geneva. They were at last wholly subdued by the Franks. In 879 Boson, count of Autun, succeeded in establishing the royal dignity again in part of this kingdom. He styled himself King of Provence, and had his residence at Arles. His son Louis added the country beyond the Jura, and thus established Cis-Juran Burgundy. A second kingdom arose when Rudolph of Strettlingen formed Upper or Trans-Juran Burgundy out of part of Switzerland and Savoy. Both these Burgundian kingdoms were united, and finally, on the ex-tinction of Rudolph's line, were incorporated But a third state, the historwith Germany. ical Duchy of Burgundy, consisting principally of the French province of Bourgogne, or Burgundy, had been formed as a great feudal and almost independent province of France in the ninth century. This first ducal line died out with a Duke Philip, and the duchy, reverting to the crown, was, in 1363, granted by King John of France to his son Philip the Bold, who thus became the founder of a new line of dukes of Burgundy. A marriage with Margaret, daughter of Louis III, count of Flanders, brought him Flanders, Mechlin, Antwerp, and Franche-Comté. He was succeeded by his son Duke John the Fearless, whose son and successor, Philip the Good, so greatly extended his dominions, that on his death in 1467 his son Charles, surnamed the Bold, though possessing only the title of duke, was in reality one of the richest and most powerful sovereigns of Europe. Charles left a daughter, Mary of Burgundy, the sole heiress of his states, who by her marriage to Maximilian of Austria transferred a large part of her dominions to that prince, while Louis XI of France acquired Burgundy proper as a male flef of France. Burgundy then formed a province, and is now represented by the four departments of Yonne, Côte-d'Or, Saône-et-Loire, and Ain. It is watered by a number of navigable rivers, and is one of the most productive provinces in France, especially of wines

**Burgundy Pitch**, a resin got from the Norway spruce and several other pines. It is used in medicine as a stimulating plaster. It takes\_ its name from Burgundy in France, where it was first prepared.

Burgundy Wines are produced in the former province of Burgundy, especially in the department of Côte-d'Or, and in richness of flavor and all the more delicate qualities of the juice of the grape they are inferior to none in the world. Among the red wines of Burgundy the finest are the Chamberlin, the Clos Vougeot, Romanée-Conty, etc.

Burial (be'ri-al), the mode of disposing of the dead, a practise which varies among different people. Among savage races, and even among some cultured peoples of the East, exposure to wild animals or birds of prey is not uncommon. The careful embalmment of their dead by the ancient Egyptians may be regarded as a special form of burial. But by far the most common forms of disposing of the dead have been burning and interring. Among the Greeks and Romans both forms were practised, though among the latter burning became common only in the later times of the republic. In this form of burial the corpse, after being borne in procession through the streets, was placed upon a pyre built of wood, and profusely sprinkled with oils and perfumes. Fire was set to the wood, and after the process of cremation was complete the bones and ashes were carefully gathered together by the rela-tives and placed in an urn. With the introduction of the Christian religion, consecrated places were appropriated for the purpose of general burial, and the Roman custom of providing the sepulcher with a stone and inscription was continued by the Christians. The practise of cremation now declined and finally disappeared, but has recently been revived.

**Bu** rlats, a nomadic Tartar people allied to the Kalmucks, inhabiting the southern part of the government of Irkutsk and Transbaikalia. Their number is about 200,000. They live in huts called *yurts*, which in summer are covered with leather, in winter with felt. They support themselves by their flocks, by hunting, and the mechanical arts, particularly the forging of iron.

Buridan (bu-rē-dün), JEAN, a French scholastic philosopher of the fourteenth century. He was a disciple of Occam at Paris, and has attained a kind of fame from an illustration he is said to have used in favor of his theory of determinism (that is, the doctrine that every act of volition is determined by some motive external to the will itself), and which still goes under the name of "Buridan's ass." He is said to have supposed the case of a hungry ass placed at an equal distance from two equally attractive bundles of hay, and to have asserted that in the supposed case the ass must inevitably have perished from hunger, there being nothing to determine him to prefer the one bundle to the other. The nature of the illustration, however, makes it more likely that it was invented by Buridan's opponents to ridicule his views than by himself.

Bu'rin (or graver), an instrument of tempered steel, used for engraving on copper, steel, etc. It is of a prismatic form, having one end attached to a short wooden handle, and the other ground off obliquely, so as to produce a sharp, triangular point. In working the burin is held in the palm of the hand, and pushed forward so as to cut a portion of the metal.

Burke, EDMUND (1730-1797), a noted British writer, orator, and statesman. He applied himself more to literature than to law, and in 1756 published his *Exactly on the Sublime and the* 

Beautiful, which attracted considerable attention, and procured him the friendship of some of the most notable men of the time. The political career for which he had been arduously preparing himself all along at length opened up to him. The great question of the right of taxing the American colonies was then occupying Parliament, and the Rockingham ministry having taken, mainly through Burke's advice, a middle and undecided course, was soon dissolved (1766). From 1770 to 1782 Lord North was in power, and Burke held no office. In 1774-80 he was member for Bristol. In several magnificent speeches he criticised the ministerial measures with regard to the colonies, and advocated a policy of justice and conciliation. In 1782, when the Rockingham party returned to power, Burke obtained the lucrative post of paymaster general of the forces, and shortly after introduced his famous bill for economical reform, which passed after considerable modifications had been made on On the fall of the Duke of Portland's it. coalition ministry, 1783, of which Burke had also been part, Pitt again succeeded to power, and it was during this administration that the impeachment of Hastings, in which Burke was the prime mover, took place. The lucidity, eloquence, and mastery of detail which Burke showed on this occasion have never been surpassed. The chief feature in the latter part of Burke's life was his resolute struggle against the ideas and doctrines of the French Revolution. His attitude on this question separated him from his old friend Fox, and the Liberals who followed Fox. His famous Reflections on the Revolution in France, a pamphlet which appeared in 1790, had an unprecedented sale, and gave enormous impetus to the reaction which had commenced in England. From this time most of his writings are powerful pleadings on the same side. In 1794 he withdrew from Parliament.

Burke, ROBERT O'HARA (1821–1861), an Australian explorer. After serving in the Austrian army he went to Australia, and after seven years' service as inspector of police was appointed commander of an expedition to cross the continent of Australia from south to north. He and his associate Willis reached the tidal waters of the Flinders River, but both perished of starvation on the return journey.

Burking, a species of murder by suffocation. which derives its name from William Burke. a native of Ireland, who, in 1828-29, was detected, tried, and executed at Edinburgh, for the murder of numerous individuals. The the murder of numerous individuals. vigilance with which the burying grounds throughout the country were watched rendered a supply of subjects for anatomical schools almost altogether impracticable, and the demand for dead bodies consequently became great. This led the above mentioned individual, in conjunction with another wretch named Hare, to decoy into their lodging house and murder by strangulation many obscure wayfarers, whose bodies they sold to a school of anatomy at prices averaging from \$40 to \$70.

### Burlesque

**Burlesque** (bur-lesk') signifies a low form of the comic, arising generally from a ludicrous mixture of things high and low. High thoughts, for instance, are clothed in low expressions, noble subjects described in a familiar manner, or *tice tersd*. The true comic shows us an instructive, if laughable, side of things; the burlesque travesties and caricatures them in order to excite laughter or ridicule.

Burlingame, ANSON (1820-1870), American statesman, b. in N. Y. He graduated in law at Harvard in 1846, became a state senator in Massachusetts in 1853, entered Congress in 1854, and sat until March, 1861. He was challenged in 1856 by Preston S. Brooks, whose brutal assault upon Charles Sumner he had denounced in fitting terms. The duel was never fought. He was then sent as U. S. minister to China, and when he was recalled, in 1867, the Chinese government engaged his services as their diplomatic representative in Europe and the U. S. He negotiated, in 1868, the treaty known by his name, by which China subscribed to the principles of international law.

Burlington, Chittenden co., Vt., on Lake Champlain, about 250 mi. n. of New York. Railroads: Central Vermont; Rutland, and Lake Champlain Transportation Co. Industries: cotton mills, woolen mill, two iron foundries, two flouring mills, and a number of other factories. Surrounding country agricultural. The town was first settled about 1780. Pop. est. 1897, 18,600.

Burlington, Des Moines co., Ia., on Mississippi River, 206 mi. s. w. of Chicago. Railroads: C. B. & Q.; St. L. K. & N. W.; C. B. & K. C.; B. C. R. & N.; T. P. & W.; B. & N. W., and many other branches of the Burlington route. Industries: iron works, two flouring mills, two iron foundries, school furniture and desk factories, wheel factory, and three for the manufacture of agricultural implements. Surrounding country agricultural. Burlington contains a 90-acre public park; and the largest auditorium in the state, seating capacity 7,000. The city was first settled in 1833. Pop. est. 1897, 27,000.

**Burlington,** Burlington co., N. J., on Delaware River, 19 mi. e. of Philadelphia. Railroad: Pennsylvania. Industries: pipe and foundry co., flour mill, iron foundry, several shoe factories and a large carriage factory. Surrounding country agricultural. Burlington is the birthplace of James Fenimore Cooper. The town was first settled by Quakers in 1677, and became a city in 1784. Pop. est. 1897, 7,900.

Bur'mah, a country of Southern Asia, area about 290,000 sq. mi. It is traversed by great mountain ranges branching off from those of Northern India and running parallel to each other southward to the sea. Between these ranges and in the plains or valleys here situated, the four great rivers of Burmah—the Irrawaddy, its tributary the Kyendwen, the Sittang, and the Salwen—flow in a southerly direction to the sea, watering the rich alluvial

### Burmah

tracts of Lower Burmah, and having at their mouths all the great seaports of the country-Rangoon, Bassein, Moulmein, Akyab, etc. The Irawaddy is of great value as a highway of communication and traffic, being navigable beyond Bhamo, near the Chinese frontier, or over 800 mi. Though its resources are almost entirely undeveloped, the country, as a whole, is productive, especially in the lower portions. Here grow rice, sugar-cane, tobacco, cotton, indigo, etc. Cotton is grown almost every-where; tea is cultivated in many of the more elevated parts. The forests produce timber of many sorts, including teak, which grows most luxuriantly, and is largely exported. Ironwood is another valuable timber; and among forest products are also the bamboo, cutch. stick-lac, and rubber. Burmah has great mineral wealth-gold, silver, precious stones, iron, marble, lead, tin, coal, petroleum, etc.; but these resources have not yet been much de-veloped. The chief precious stone is the ruby, and the mines of this gem belong to the crown. Sapphire, amber, and jade are also obtained. Among wild animals are the elephant, rhinoceros, tiger, leopard, deer of various kinds, and the wild hog. Among domestic animals are the ox, buffalo, horse, and ele-phant. The rivers abound with fish. The most common fruits are the guava, custardapple, tamarind, pine, orange, banana, jack, and mango. The yam and sweet potato are cultivated, and in some parts the common potato. The climate of course varies according to elevation and other circumstances, but as a whole is warm, though not unhealthy, except in low jungly districts. The rainfall among the mountains reaches as high as 190 in. per annum.

The population may be stated at about 8,000,000 or 9,000,000, made up of a great variety of races besides the Burmese proper, as Talaings, Shans, Karens, etc. The Burmese proper are of a brown color, with lank, black hair (seldom any on the face), and have active, vigorous, well-proportioned frames. They are a cheerful, lively people, fond of amusement, averse to continuous exertion, free from prejudice of caste or creed, temperate and hardy. The predominant religion is Buddhism. The Burmese are skillful weavers, smiths, sculptors, workers in gold and silver. joiners, etc. The ordinary buildings are of a very slight construction, chiefly of timber or bamboo raised on posts; but the religious edifices are in many cases imposing, though the material is but brick. Carving and gilding are features of their architecture. The Burmese language is monosyllabic, like Chinese, and is written with an alphabet the characters of which (derived from India) are more or less circular.

Burmah is now divided into Lower Burmah and Upper Burmah, the former till 1886 being called British Burmah, while the latter till that date was an independent kingdom or empire. Lower Burmah was acquired from Independent Burmah in 1826 and 1852 as the result of two wars terminating in favor of

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Britain. It comprises the divisions of Aracan, Pegu, Irrawaddy, and Tenasserim. Area,87,473 sq. mi.; pop. (1891) 2,946,933. Under British rule it has prospered greatly, the population and trade having increased immensely, there being regularly a large surplus revenue. Roads, canals, and railways have been constructed and other public works carried out, as also public buildings erected. The chief city and port is Rangoon, which is now connected by railway with Mandalay in Upper Burmah.

Under its native kings the form of government in Upper Burmah was an absolute monarchy, the seat of government being latterly at Mandalay. The king was assisted in governing by a council of state known as the Hlootdaw, to which belonged the functions of a house of legislature, a cabinet, and a supreme court. The king had power to punish at his pleasure any one, even the great officers of state. The revenue was derived from taxes levied in a very irregular and capricious manner, and official corruption was rampant. The criminal laws were barbarously severe. Capital punishment was commonly inflicted by decapitation, but crucifixion and disembowelling were also practised. After the loss of the maritime provinces the influence of Independent Burmah greatly declined, as did also its Asiatic and foreign trade.

The Burmese Empire is of little note in ancient or general history. Since the sixteenth century the Burmese proper have mostly been the predominant race, and ruled the Peguans, Karens, etc., throughout the country. The capital has at different times been at Ava, The Pegu, Prome, or elsewhere. In the latter half of the eighteenth century the Burmese emperors began a series of wars of conquest with China, Siam, Assam, through which they greatly en-larged the empire. This brought them into contact with the British, and in 1824 war was declared against them on account of their encroachments on British territory and their seizure of British subjects. The war terminated in the cession of the provinces of Aracan and Tenasserim to the British. Peace continued for some years, but latterly various acts of hostility were committed by the Burmese, and in 1852 the maltreatment of British subjects occasioned a second war, at the end of which the British possessions were extended to include the whole of Pegu. The third and last war occurred in 1885 in consequence of the arrogance and arbitrary conduct of King Theebaw. The result was that Upper Burmah was annexed to the British empire by procla-mation of the Viceroy of India, Jan. 1, 1886. The area thus annexed was about 200,000 sq. mi., of which half belonged to the kingdom proper, half to the semi-independent Shan states. The country is yet far from tranquil, bands of *dacoits*, or robbers, causing much trouble. There are about 20,000 military stationed in it.

**Bur' naby**, FREDERICK GUSTAVUS (1842-1885), English soldier and traveler. He was educated at Harrow, and entered the Royal Horse Guards in his eighteenth year. In 1875 he made his famous ride to Khiva — a journey that presented great difficulties. In 1876 he rode through Asiatic Turkey and Persia. Of both these journeys he published narratives. In 1885, while serving as lieutenant colonel of the Royal Horse Guards in the Egyptian campaign, he was slain at the battle of Abu-Klea.

paign, he was slain at the battle of Abu-Klea. Burnand, FRANCIS COWLEY (1837-), English humorist; educated at Eton and Trinity College, Cambridge, and admitted to the bar in 1862. In 1880 he became editor of the London Punch, to which he had contributed for several years. He wrote many burlesques, of which *Irion* and *Black-Eyed Susan* were very successful.

**Burne-Jones**, EDWARD (1833-), an English painter. He early adopted the profession of artist, and came under the influence of D. G. Rossetti. He has painted in water-color as well as oil, and his works are remarkable for richness of coloring as well as for their poetical, ideal, and mediæval characteristics.

Bur'net, the popular name of two genera of plants, natural order Rosaceæ: 1, Common or lesser burnet, a perennial plant of North



1-Common Burnet. 2-Great Burnet. a-A floret, b-Flower-head.

America and Europe, which grows to the height of about 2 ft., with smooth, alternate, imparipinnate leaves, and flowers arranged in rounded heads of a purplish color. 2, Greater burnet, also a perennial plant with imparipinnate leaves; flowers red, arranged on oval spikes at the extremity of long peduncles. Both kinds make very wholesome food for cattle. There is also a Canadian species.

Bur' net, GILBERT (1643-1715), a noted British historian. Having studied at Aberdeen, he traveled into Holland in 1664. He was ordained in 1665, was for some years minister of Saltoun parish, and became professor of divinity at Glasgow in 1669. He was long in great favor at court, but the court favor did not continue, for Burnet, dreading the machinations of the Catholic party, joined the opposition, and wrote his *History of the Reformation in England*. Eventually he was invited to The Hague by the Prince and Princess of Orange, and had a great share in the councils relative to Britain. He accompanied the Prince of Orange to England as chaplain, and was rewarded for his services with the bishopric of Salisbury. As a prelate, Bishop Burnet distinguished himself by fervor, assiduity, and charity.

Burnett's Disinfecting Liquid, an antiseptic liquid and deodorizer prepared from chloride of zinc. It is useful in deodorizing sewerage, bilge water in ships, etc., and is found of service in the dissecting room.

Burnett, FRANCES ELIZA HODGSON, an American novelist, b. 1849, in Manchester, England. She came to this country in 1865, and in 1873 married Dr. S. M. Burnett. Her best known works are Surly Tim's Trouble (1872), That Lass o' Lowrie's (1876), Haworth's (1878), A Fair Barbarian (1881), Through One Administration (1882), and Little Lord Fauntleroy, the last named having been successfully dramatized. Burnham, SHELBOURNE W., b. 1840, an

Burnham, SHELBOURNE W., b. 1840, an American astronomer. He was for many years shorthand reporter in the courts of Chicago, and devoted all his leisure to astronomical studies. Mr. Burnham was connected with the Dearborn observatory, and made a special study of double stars, of which he recorded more than any other man. When the Lick observatory in California was erected he was asked to take charge of it. He was a member of the Royal Astronomical Society, and wrote many papers of great value. He is now a professor of astronomy at the University of Chicago, and is continuing his researches at the new Yerkes observatory.

Burning glass, a lens which, by bringing the sun's rays rapidly to a focus, produces a heat strong enough to kindle combustible matter. The lenses commonly used are convex on both sides, and having a small focal distance. That such a glass may produce its greatest effect it is necessary that the rays of the sun should fall upon it in a perpendicular direction. The effect may be greatly augmented by the use of a second lens, of a smaller focal distance, placed between the first and its focus. Some immense burning glasses have been made, producing surprising effects. Concave burning mirrors produce the same kind of results, and have almost four times more power than burning glasses of equal extent and curvature. The concavity must present a surface of high reflecting power (polished silver or other metal, or silvered glass), and must be either spherical or parabolic. Plane mirrors may also be employed like concave ones, if several of them are combined in a proper manner. The ancients were acquainted with such mirrors, and Archimedes is said to have set the Roman fleet on fire at the siege of Syracuse (B. c. 212) by some such means. In 1747

Buffon by a combination of mirrors burned wood at the distance of 200 ft. and melted tin at the distance of 150, etc.

**Burnisher**, a blunt, smooth tool, used for smoothing and polishing a rough surface by rubbing. Agates, tempered steel, and dogs' teeth are used for burnishing.

**Burn' ley**, a city of England, in Lancashire, about 22 mi. n. of Manchester. The staple manufacture is cotton goods, and there are large cotton mills and several extensive foundries and machine shops, with collieries and other works, in the vicinity. Pop. 87,058.

**Burnoose** (ber-nös') a large kind of mantle, in use among the Bedouin Arabs and the Berbers of Northern Africa, commonly made of white wool, but sometimes also of red, blue, green, or some other color, and having a hood which may be drawn over the head in case of rain.

Burns, ROBERT (1759-1796), the great lyric poet of Scotland, was b. near Ayr, his father being a gardener, and latterly a small farmer. He was instructed in the ordinary branches of an English education by a teacher engaged by his father and a few neighbors; to these he afterward added French and a little mathematics. But most of his education was got from the general reading of books, to which he gave himself with passion. In this manner he learned what the best English poets might teach him, and cultivated the instincts for poetry which had been implanted in his nature. At an early age he had to assist in the labors of the farm; and when only fifteen years old he had almost to do the work of a man. In 1781 he went to learn the business of flaxdresser at Irvine, but the premises were de-stroyed by fire, and he was thus led to give up the scheme. His father dying in 1784, he took a small farm (Mossgiel) in conjunction with his younger brother Gilbert. He now began to produce poetical pieces which attracted the notice of his neighbors and gained him considerable reputation. His first lines had been written some time previously, having been inspired by love, a passion to which he was peculiarly susceptible. His love affair with Jean Armour of Mossgiel decided him to emigrate to Jamaica, and engage himself as assistant overseer on a plantation there. To obtain the funds necessary for the voyage he was in-duced to publish, by subscription, a volume of his poetical effusions. It was printed at Kilmarnock in 1786, and Burns, having thus obtained the assistance he expected, was about to set sail from his native land, when he was drawn to Edinburgh by a letter from Doctor Blacklock to an Ayrshire friend of his and the poet, recommending that he should take advantage of the general admiration his poems had excited, and publish a new edition of them. This advice was eagerly adopted, and the result exceeded his most sanguine expectations. After remaining more than a year in the Scottish metropolis, admired, flattered, and caressed by persons of eminence for their rank, fortune, or talents, he retired to the country with the sum of some \$2,500, which he had

### Burns and Scalds

realized by the second publication of his poems. A part of this sum he advanced to his brother, and with the remainder took a considerable farm (Ellisland) near Dumfries, to which he subsequently added the office of exciseman. He now married, or rather formally completed his marriage with Jean Armour. But the farming at Ellisland was not a success, and in about three years Burns removed to Dumfries and relied on his employment as an exciseman He continued to exercise his pen, alone. particularly in the composition of a number of beautiful songs adapted to old Scottish But his residence in Dumfries, and tunes. the society of the idle and the dissipated who gathered around him there, attracted by the brilliant wit that gave its charm to their convivialities, had an evil effect on Burns, whom disappointment and misfortunes were now making somewhat reckless. In the winter of 1795 his constitution, broken by cares, irregularities, and passions, fell into premature decline; and a rheumatic fever terminated his life and sufferings at the early age of thirtyseven. He left a wife and four children, for whose support his friends and admirers raised a subscription, and with the same object an edition of his works, in four volumes, 8vo., was published in 1800 by Doctor Currie of Liver-pool. His character, though marred by imprudence, was never contaminated by duplicity or meanness. He was an honest, proud, warmhearted man, combining sound understanding with high passions and a vigorous and excursive imagination. He was alive to every species of emotion: and he is one of the few poets who have at once excelled in humor, in tenderness, and in sublimity.

Burns and Scalds are injuries produced by the application of excessive heat to the human body. They are generally dangerous in proportion to the extent of surface they cover, and a wide-spread scald may cause serious consequences on account of the nervous shock. Congestion of the brain, pneumonia, inflam-mation of the bowels, or lockjaw may result from an extensive burn. Hence the treatment requires to be both local and constitutional. If there is shivering or exhaustion hot brandy and water may be given with good effect, and if there is much pain, a sedative solution of opium. The local treatment consists in dredging the burn with fine wheat flour, and then wrapping it up in cotton-wool. An application of equal quantities of olive oil and lime water, called carron-oil, is much recommended by some, the part being afterward covered by cotton-wool. The main thing is to keep the air from the injured part, and therefore, when a blister forms, although it may be pricked, the loose skin should not be removed.

Burnside, AMBROSE EVERETT (1824-1881), an American soldier. His ancestors were Scotch, and emigrated to South Carolina in 1746. Ambrose, the fourth of nine sons, was born in a log cabin. At the age of seventeen he was indentured to a merchant tailor, and, after learning his trade, began business in Liberty,

### Burnt-umber

Ind. He entered the U. S. military academy, was graduated in 1847, and went to Mexico as Second Lieutenant of Third Artillery. In 1852 he resigned his commission. At the beginning of the Civil War he took command of a regiment from Rhode Island. He commanded a brigade at Bull Run, and when General Hunter was wounded assumed command. On Aug. 6, 1861, he was made brigadier general of volunteers. On October 23 he was ordered to Annapolis, Md., to organize a "coast division." intended to operate along the lower Potomac and the Chesapeake Bay, but the plan was changed, and it was sent to Pamlico Sound by way of Hatteras Inlet, and on Feb. 5. 1862, the fleet captured the Confederate garrison of 2,500 men on Roanoke Island. Burnside relinquished the department of North Carolina, and was transferred to the Army of the Potomac. He was twice offered the chief command and declined. He was sent with command of the first and ninth corps to meet General Lee at Sharpsburg, and encountered the Confederate force at South Mountain. His force, the ninth corps, held, with great loss of life, the stone bridge at Antietam, which was the important post of that battle. General Mc-Clellan was relieved in November and Burn-side took the command. He was superseded by Major-General Hooker, and transferred to the department of the Ohio. In August, 1863, he crossed the Cumberland Mountains to Knoxville, where he lay fortified for a siege. General Sherman relieved him, and he devoted himself to reorganizing the ninth corps. He resumed command in April, 1864, at Annapolis, with nearly 20,000 men, and was again attached to the Army of the Potomac under General Grant. He led his force at the Wilderness, Cold Harbor, and Petersburg, and suffered severe defeats. General Meade brought charges of disobedience against General Burnside and ordered a court-martial, which found him "answerable for the want of success." He resigned from the army on April 15, 1865. and became identified with railroad management. He was elected governor of Rhode Island in 1866, 1867, and 1868, but declined re-election. He went to Europe during the Franco-Prussian War, and was called upon to act as envoy between the two forces endeav-oring to negotiate peace. Returning to this country he was elected to the U. S. Senate from Rhode Island in 1875 and re-elected in 1880.

**Burnt-offering**, something offered and burnt on an altar as an atonement for sin; a sacrifice. The burnt-offerings of the Jews were either some clean animal, as an ox, a sheep, a pigeon; or some species of vegetable substance, as bread, flour, ears of wheat or barley.

**Burnt-sienna**, an ochreous earth known as sienna-earth submitted to the action of fire, by which it is converted into a fine orangebrown pigment, used both in oil and watercolor painting.

Burnt-umber, a pigment of reddish-brown color obtained by burning umber, a soft earthy mixture of the peroxides of iron and

manganese, deriving its name from Umbria in Italy.

Burr, AARON (1750-1836), an American statesman, b. at Newark, New Jersey, graduated at Princeton. where his father and grandfather (Jonathan Edwards) had been president of the college, and in 1775 joined the patriot army, in which he gained a high reputation, and in 1777 the rank of lieutenant colonel. Retiring in 1779, he was in 1782 called to the bar, where he soon became a leader. He was attorney general in 1788-90, U.S. senator in 1791-96, and vice-president of the U.S. in 1800-4. His defeat in a contest for the governorship of New York led him to force a duel (July 11, 1804) on the most active of his opponents, Alexander Hamilton, who had been his personal rival for many years, and who now fell mortally wounded at the first fire. Burr fied to South Carolina, and though indicted for murder, returned after the excitement had subsided, and completed his term as vice-president. He now prepared to raise a force to conquer Texas, and establish there a republic, which might detach the Western states from the Union. This enterprise was proclaimed by the president, and Burr tried for treason (1807). Acquitted, but bankrupt in reputation, he spent some wretched years in Europe, and in 1812 returned to his law practise in New York. Here, shunned by society, the unhappy man, who had long survived all the members of his own family, died on Staten Island, in a home for which he was indebted to the charity of an old friend. Burr was a man of the world, of polished man-ners and fascinating address. He early adopted pronouncedly infidel views.

Burrard Inlet, an inlet of British Columbia, forming a fine harbor, and having Vancouver, the terminus of the Canadian Pacific railway, on its northern shore.

**Burrillville**, Providence co., R. I., has numerous manufactories and a national bank. Pop. 5,492.

**Bur ritt**, ELIHU (1810–1879), the "learned blacksmith," was b. at New Britain, Conn. He was apprenticed to a blacksmith, but began to read English literature, and acquired proficiency in the ancient and most modern languages of Europe. He afterward came into public notice as a lecturer on behalf of temperance, the abolition of slavery and war, etc., and founded papers, missions, and organizations to further these ends. In 1848 the first International Peace Congress was held under his guidance at Brussels. In 1865 he was consular agent at Birmingham. In 1868 he returned to live on his farm in America. His best known writings are Sparks from the Antil, Thoughts and Things at Home and Abroad; Chips from Many Blocks.

**Burroughs**, JOHN, b. 1837. An American author, wrote extensively on natural history. His charming essays on the beauties of nature were extremely popular in America and Europe.

**Burrowing-owl**, an American owl, which dwells in holes in the ground either made by itself or by some other animal, as the prairie dog or marmot. It feeds on insects and seeks its food by day.

Burrows, JULIUS CZEAR, American statesman, b. in Erie co., Pa., 1837. He served in the Union army 1862-1864, and after the war became prosecuting attorney of Kalamazoo co., Mich. In 1875-76 he served in Congress as a Republican, and again from 1870-1881. In 1884 he was again elected from the fourth Michigan district, and re-elected in 1886 and 1888. He is now in the U. S. Senate from the state of Michigan.

Bur'sary, an endowment in one of the Scotch universities, intended for the support of the student during his ordinary course, and before he has taken a degree in the faculty in which he holds the bursary. This circumstance, according to the usage prevailing in Scotland, distinguishes bursaries from scholarships and fellowships, both of which are bestowed after the student has taken a degree. Each of the four universities of Scotland has a greater or smaller number of bursaries. Of late years most bursaries are awarded after competitive examination, and only a few are now given by the patrons for special reasons.

Burs'lem, a town of England, in Staffordshire, in the center of "The Potteries." Here is the Wedgwood Memorial Institute, comprising a free library, a museum, and a school of art, erected in honor of Josiah Wedgwood, who was b. at Burslem in 1730. Burslem has extensive manufactures of china and earthenware, in which trade and coal-mining the inhabitants are chiefly employed. Pop. 30,862.

Burton, JOHN HILL (1809-1881), historian of. Scotland. He early contributed to the Westminster Review, as afterward to the Edinburgh and North British, to Blackwood's Magazine, and to the Scotsman. His first book was the Life and Correspondence of David Hume, followed by Lives of Lord Lowert and Duncan Forbes of Culloden, and other works. His chief work was his History of Scotland from the Earliest Times to 1746, others equally well known were The Scot Abroad, and the Book-hunter.

**Bur'ton**, ROBERT (1576-1640). a British author. His vast out-of-the-way learning is curiously displayed in his book *The Anatomy of Melancholy*, which he published in 1621.

of Metancholy, which he published in 1021. **Burton**, WM. E. (1804-1800), an American actor. He began his theatrical career in England, and in 1834 came to the U. S. and appeared in standard comedies in Philadelphia and New York. In 1848 he became manager of the theater in Chambers street. Burton's Falstaff, his Amiuadab Sleek and his Toodles, dwell in the memory of veterau play-goers to this day.

Burton, RICHARD FRANCIS (1821-1890), a famous English traveler. He acquired a familiarity with nearly all the Oriental languages, and disguised as a pilgrim (Hadji) visited Mecca and Medina in 1853. He served with credit in the Crimea, and from 1856 to 1859 was engaged in Central African explorations. Subsequently he was English consul at Damascus and Trieste. He wrote over thirty volumes of travels, and in 1885-1888 published a literal translation of the *Arabian Nights*, of which only a limited number of copies were issued.

Burton-on-Trent, a town of England, in Staffordshire, on the n. bank of the Trent, in a low, level situation. Malting and iron-founding are carried on to a considerable extent, but it is chiefly celebrated for its excellent ale, for which there are numerous breweries, employing upward of 5,000 men and boys, the largest establishments being those of Messrs. Bass & Co. and Messrs. Allsopp. Pop. 46,047.

Bury (be'ri), a town of England, in Lancashire, 8 mi. n.n.w. of Manchester, well situated on a rising ground between the Irwell and the Roche. The staple manufacture is that of cotton, and there are also large woolen factories, bleaching and printing works, dye works, foundries. etc. Sir Robert Peel was b. near Bury in 1788, and a bronze statue of him adorns the town. Pop. 57,206.

**Burying-beetle**, the name of a genus of insects belonging to the order of beetles, and the tribe of the carrion beetles. They have a very keen scent, which guides them to the dead bodies of rats, mice. etc., which form their



Burying-beetle.

food. Several beetles will unite to cover such animals, burying them sometimes more than 6 in. in the earth. They deposit their eggs on the carrion, and in less than a fortnight the larvæ issue. The species are common everywhere.

Bury St. Edmond's (or St. Edmondsbury), a town in Suffolk, England, 26 mi. from Ipswich. Agricultural implements are manufactured, and there is a large trade in agricultural produce. It is an ancient place, and derived its name from St. Edmund, a king of the East Angles, slain by the heathen Danes and buried here. It contains the remains of an abbey, once the most wealthy and magnificent in Britain. Pop. 16,630.

**Busa'co**, a mountain ridge in the province of Beira, Portugal. It was here that Wellington repulsed Massena (Sept. 27, 1810) and continued his retreat to the lines of Torres Vedras.

**Bush-buck**, a name given to several species of antelopes, especially to an antelope of South Africa, 4 ft. long, and  $2\frac{1}{2}$  ft high, with triangular sub-spiral horns. The male is dark sepia brown, and the female reddish brown above; both are white below. The *while-backed bushbuck* is a white-backed antelope of Sierra Leone, with black, shining, pointed, and nearly straight horns, short, slender limbs, sleek, glossy, deep brown hair.

**Bushire** (bü'shēr) (properly *Abu Shehr*, the father of cities), the principal seaport of Persia, on the Persian Gulf, 1184 miles w.s.w. Shiraz. It carries on a considerable traffic with India and Britain, importing rice, indigo, sugar, cotton goods, etc., and exporting shawls, dates, tobacco, carpets, wool, drugs, etc. Pop. 25,000.

Bushmen (or Bosjesmen), a race of people who dwell in the western part of South Africa, in the immense plains bordering on the north side of the Cape of Good Hope. They are the most degraded of the races which inhabit this part of the country. They do not form societies, but unite only for defense or pillage. They have no huts, and do not cultivate the land, but support themselves by hunting. Their language is exceedingly poor, consisting only of a certain clicking with the tongue and harsh gurgling tones, for which we have no letters.

Bush rangers, the name for desperadoes or escaped convicts in Australia who, taking to the bush, supported themselves by levying contributions on the property of all and sundry within their reach. Considerable gangs of these lawless characters have sometimes collected, a body of fifty holding part of New South Wales in terror about 1830. A gang of four fell victims to justice in 1880, after having robbed a bank and committed other outrages. At the present day, owing to better police arrangements, increased population, and the introduction of railroads and telegraphs, bushrangers are practically extinct. Business Colleges, the name for the higher-

Business Colleges, the name for the higherclass institutions specially intended to give a practical training in all subjects belonging to commerce.

**Busi ris,** a town of ancient Egypt, in the Delta, the chief place where the rites of Isis were celebrated. The name is also given as that of a mythical Egyptian king.

**Bus' kin**, a kind of high shoe worn upon the stage by the ancient actors of tragedy, in order to give them a more heroic appearance; often used figuratively for tragedy, like "sock" for comedy.

Bussu-paim, a tree found in the swamps of the Amazon, whose stem is only 10 to 15 ft. high, but whose leaves are often 30 ft. long by 4 to 5 ft. in breadth. These are used by the Indians for thatch, the spathes are used as bags, or when cut longitudinally and stretched out they form a coarse but strong kind, of cloth.

Bust, in sculpture, the representation of that portion of the human figure which comprises the head and the upper part of the body. During the literary period of Greece the portrait busts of the learned formed an important branch of art, and in this way we come to possess faithful likenesses of Socrates,

#### Bustard

Plato, Demosthenes, etc., in which the artists show great power of expressing the character of those represented. The number of busts belonging to the time of the Roman Empire is very considerable, but those of the Roman poets and men of letters have not been preserved in nearly so large numbers as those of the Greeks. The first bust that can be depended upon as giving a correct likeness is that of Scipio Africanus the elder.

**Bus'tard**, a bird belonging to the order of runners, but approaching the waders. The great bustard is the largest European bird, the male often weighing 30 lbs., with a breadth of wing of 6 or 7 ft. The bustard is now rare



#### Great Bustard.

in Britain, but abounds in the south and east of Europe and the steppes of Tartary, feeding on green corn and other vegetables, and on earthworms. Its flesh is esteemed. All the species run fast, and take flight with difficulty.

**Bute** (būt), an island of Scotland. Pop. 11,-735; belonging principally to the Marquis of Bute. It is about 15 mi. long, and the average breadth is  $3\frac{1}{2}$  mi. In Kames Hill it rises to the height of 875 ft.; it has several pretty lakes, the principal of which is Loch Fad,  $2\frac{1}{4}$  mi. long. The herring fishery is a source of considerable profit. The only town is Rothesay.

siderable profit. The only town is Rothesay. Butler, Butler co., P.a., on Connoquenesug Creek. Railroads: P. R. R.; B. & O.; P. B. & L. E. Industries: plate glass works, two flouring mills, two iron foundries, woolen mill, and thirteen other factories. Surrounding country agricultural; coal, oil, and gas in vicinity. The town was first settled in 1803. Pop. est. 1897, 12,000.

Butler, BENJAMIN F. (1818–1896). American lawyer, general, and politician. He practised law in Lowell, Mass., and became prominent in his profession. Previous to the Civil War he was twice a candidate for the governorship of Massachusetts. He was appointed brigadier general of the state militia at the outbreak of the Civil War, and marched to Annapolis, Md.,

with the eighth Massachusetts regiment, to command the district of Annapolis, including Baltimore. He was appointed major general of volunteers in May, 1861, and given com-mand of the department of Eastern Virginia. General Butler captured Fort Clark and Fort Hatteras in August, 1861. The following March he led an expedition to the Gulf of Mexico. Butler commanded at New Orleans after it was captured by Farragut, from May to December. He armed the free colored men. Jefferson Davis, 1862, issued a proclamation declaring him to be an outlaw. In 1863 he was placed in command of Virginia and North Carolina with the Army of the James. He formed a plan to capture Richmond by operations from the south side of the James, intending to co-operate with the Army of the Potomac from the north. He was checked by General Beauregard. Later he was sent to Fort Fisher, N. C. He was removed from command by General Grant, and returned to Massachusetts. In 1866 he was elected to Congress as a Republican, and served until 1879, with the exception of the year 1875-76. He took an active interest in the impeachment of President Johnson. In 1871 he was the unsuccessful Republican nominee for governor of Massachusetts. In 1878 and 1879 he was again defeated for the same office on the ticket of the Greenback party. In 1882 he was elected by the Democrats. In 1884 he ran as the Greenback-Labor candidate for president, but did not get any votes in the electorial college.

Butler, ELIZABETH S., b. 1844, in Switzerland. She achieved fame by her pictures, *Missing, The Roll-Call, Balaklava*, and *Inker*mann, shown at the Royal Academy 1873. In 1877 she married Major General Butler, of the British army.

**Butler**, JAMES (1610-1688), duke of Ormonde, an eminent statesman in the reigns of Charles I and II.

Butler, JOSEPH (1692-1752), an English prelate and celebrated writer on ethics and theology. His great work is the Analogy of Religion. Natural and Rerealed, to the Constitution and Course of Nature, which acquired for him a great reputation.

Butler, WILLIAM ALLEN, b. in Albany, N. Y., 1825; American author; son of B. F. Butler, who was attorney general in Jackson's cabinet. Mr. Butler wrote, in 1857, a society satire in verse—Nothing to Wear—and has been a liberal contributor to the magazines.

Butler, WILLIAM FRANCIS, b. 1838; British soldier; entered the British army in 1858, and served in the Red River and Ashantee expeditions. He also held high command in the Soudan, and is a major general and commander of the Bath. He is the author of *The Great Lone Land* and *The Wild North Land*, which were published in 1872 and 1873 respectively.

**Butt**, ISAAC (1813-1879), Irish statesman. He was professor of political economy in the University of Dublin, 1836-41, and sat in Parliament as a Liberal-Conservative, 1852-65.



He was a prominent member of the Irish bar, and defended Smith O'Brien in 1848. In 1871 he was elected as a Home Ruler. He later lost his influence.

Butte City, Silver Bow co., Mont., 65 mi. s. w. of Helena. Railroads: Montana Central; Union Pacific; Northern Pacific, and Montana Union. In the vicinity are rich gold, silver and copper mines and smelting works. Pop. est. 1897, 10,723.

Butter, a fatty substance extracted from the ilk of mammalia. The amount of butter milk of mammalia. from the milk of well-fed cows is about four Butter is best made from the cream per cent. of the milk, but in large factories the whole of the milk is usually churned. Milk is very sensitive to environment and the flavor of the butter depends largely on the treatment of the milk. Butter is extracted by agitation which ruptures the minute fat globules and causes them to collect in masses. Butter for market is packed in tin or wooden tubs, or earthen jars, or is fashioned into rolls or pats. The rich yellow natural color of butter depends largely upon the richness of the pasture. Butter is artificially colored by arnetto. Skill is required in salting butter. One half ounce of common salt to two pounds of butter is the rule, but one ounce to a pound of butter is sometimes used. Butter in chemistry is applied to substances of a buttery consistency. Butter is a name applied to certain metallic substances which have an oily appearance, as butter of antimony.

**Butterbur**, a composite plant, with large rhubarb-like leaves and purplish flowers, growing by the side of streams: allied to coltated

ing by the side of streams; allied to coltsfoot. Buttercup, the popular name of two or three species of the Ranunculus. They are common plants with brilliant yellow flowers.

Butterfly, the common name of all diurnal lepidopterous insects, corresponding to the original Linnæan genus Papilio. The family of the butterflies or diurnal Lepidoptera (so called to distinguish them from nocturnal or crepuscular Lepidoptera, such as moths) is a very extensive one and naturalists differ much as to the manner of subdividing it. One of the most remarkable and interesting circumstances connected with these beautiful insects is their series of transformations before reaching a perfect state. The female butterfly lays a great quantity of eggs, which produce larvæ, commonly called caterpillars. After a short life these assume a new form, and become chrysalids or pupæ. These chrysalids are attached to other bodies in various ways, and are of various forms; they often have brilliant golden or argentine spots. Within its covering the insect develops, to emerge as the active and brilliant butterfly. These insects in their perfect form suck the nectar of plants, but take little food, and are all believed to be short-lived; their work in the perfect state being almost confined to the propagation of the species. Butterflies vary greatly in size and coloring, but most of them are very beautiful. The largest are found in tropical countries, where some measure nearly a foot

across the wings. They may generally be distinguished from moths by having their wings erect when sitting, the moths having theirs horizontal. Some of them have great powers of flight. Among the most remarkable butterflies are those that present an extraordinary likeness to other objects—leaves, green or withered, flowers, bark, etc., a feature that serves greatly to protect them from enemies.

serves greatly to protect them from enemies. Butterfly-weed, the pleurisy root of America, where it has a considerable reputation as an article of the materia medica. It is an expectorant, a mild cathartic, and a diaphoretic, and is employed in incipient pulmonary affections, rheumatism, and dysentery.

But terine (-ēn), an artificial butter, prepared from beef suet, milk, butter, and vegetable oil, and now largely made in Britain, the U.S., Holland, etc. By the use of coloring matters it can be made to resemble butter of any given brand; but although quite wholesome when well made, it has not the delicate flavor and aroma of the highest-class butters. To prevent fraudulent sales Congress has passed a law requiring under penalty that every package containing artificial butter shall be duly marked, and that retail dealers shall not sell except from the original package.

The process of manufacturing butterine is very interesting. One of the principal in-gredients of butter is olein. This is obtained from the caul-fat. As soon as the fat comes in from the slaughter house it is dumped into a vat of water, where all the blood and dirt is washed out. It is then poured into a row of iron kettles provided with steam jackets for heating purposes. The temperature is raised to 155° and the oil slowly tried out. When the fat has been sufficiently heated it is drained off into large cool kettles, where all the dirt and refuse settles to the bottom. The clear oil is then drawn out into tin-lined trucks and taken to a big room, where it is allowed to cool and granulate for a few days at a temperature of about 85<sup>o</sup>. It is then sent to the press room. Here is a small rectangular box open at the top and fastened to the table. A piece of stout white duck is spread over this and enough of the oil is dipped up to fill the box. The top of the duck is folded over the soft mass, and the whole is put into the presser. This machine consists of 60 pieces of sheet iron loosely fastened at the end to shafts. Between each pair of these plates 80 of the little duck packages of tallow are placed, and when the whole machine is full, pressure is applied by means of a screw at the top. The oil is gradually squeezed out through the duck and drops down into a trough. About 29 lbs. of this oleomargarine oil is obtained from 50 lbs. of fat. The product left in the duck is known as stearine, of pure white and almost tasteless substance, which is used in making certain brands of lard. The oil as it runs from the press is ready for use in making butterine and goes directly to the factory. Butterine is usually made in a three-story building and the process begins on the top floor. Here the oil is pumped into several large steam-jack-

eted kettles and stirred by means of dashes, the temperature is raised to 185° to melt the oil thoroughly. It is then conveyed into large tin-lined vats, where it is stored and chilled. It is then passed through a bath of brine where it is washed and deodorized. It then has a distinctly buttery taste. It is packed in tin-lined trays and packed in a cool store room until it is needed for use. Pure leaf lard which has gone through the process of deodorizing in brine is also brought into the store room and is one of the principal con-stituents of butterine. The oil and the lard are then shoveled in equal quantities into a large chute which leads to the creamery below. The chute leads to a large vat or churn heated to 180°. Here the mixture is rapidly stirred with wooden paddles until the lumps all disappear. Then a quantity of genuine butter and buttermilk, usually about 20 per cent. of the whole, is put in together with a little butter-color and the stirring is continued. When the oleomargarine comes from the churn it looks very much like butter. It is dumped on a circular table, and the buttermilk is squeezed out by means of a butter worker operated by machinery, and the salt is worked in. The butterine is then taken to a storage room for a day. It is then reworked and is ready to be put up in packages. The boxes in which the butterine is packed are marked and stamped. It has been shown by chemical analysis that butterine is almost identical with butter, and that one is digested as easily as the other.

Buttermilk, the milk from which butter has been extracted, forming a nutritious and agreeable cooling beverage with an acidulous taste.

Butternut, the fruit of the white walnut. an American tree, so called from the oil it contains. The tree bears a resemblance in its general appearance to the black walnut, but the wood is not so dark in color.

Buttertree, a name of several trees yielding oily or fatty substances resembling butter.



Common Butterwort. a .-- a flower,

grounds in Europe, Canada, etc. The leaves are covered with-soft, pellucid, glandular hairs, which secrete a glutinous liquor that catches small insects. The edges of the leaf roll over on the insect and retain it, and the insect thus retained serves as food for the plant. In the north of Sweden the leaves are employed to curdle milk.

Butterworth, BENJAMIN, b. 1837, American statesman; educated at

### Buttons

Ohio University, admitted to the bar in 1861, and practised law in Cincinnati. In 1870 he became U. S. district attorney, and in 1873-74 state senator. He was elected to Congress in 1878 and 1880, became commissioner of patents in September, 1883, and in 1884, 1880, and 1888 was re-elected to Congress from the first (Cincinnati) district of Ohio. Mr. Butterworth is a Republican, and introduced the compulsory army retirement act. He was appointed commissioner of pensions by President McKinley in 1897.

Buttons are of almost all forms and materials-wood, horn, bone, ivory, steel, copper, silver, brass, etc., which are either left naked



a.-Filigree silver button of Norway; b.-Filigree silver button of Ireland; c.-Japanese button.

or covered with silk or some other material. The material of buttons has varied much with times and fashions. In the last century gilt, brass, or copper buttons were almost universal. Birmingham was the great seat of manufacture, as it yet is of metallic and other buttons. The introduction of cloth-covered buttons early in this century made a great revolution in the trade, and led to great varie-ties in the style of making up. The metal buttons now used are commonly made of brass or a mixture of tin and brass. They are usually made from sheets of metal by punching and stamping. Such buttons are generally used for trousers. A substance now very commonly used for buttons is vegetable ivory (seeds of the ivory-nut palm), which may be colored according to taste. Mother-of-pearl buttons are another common kind. Of late years the making of porcelain buttons has developed into a re-markable industry. These buttons are both strong and cheap. Besides these kinds there are also glass buttons, made by softening the plass by heat and pressing it into a mold; but-tons of vulcanite, marble, and many other materials; but these are fancy articles in the trade. Buttons made of vegetable ivory are in very common use. The material is obtained from a palm tree that grows in South America. When young the seed of this palm contains a milky substance which becomes very hard and white, resembling ivory. The seeds are from
## Buttresses

an inch to three inches in size and almost round. First they are steamed to render their cutting easier. after which they are sawed into slices of proper thickness. The button is cut out with a peculiar saw, and each button is turned separately in a small lathe. The thread holes are then drilled and the buttons polished and finished. Buttons which have emblems and special designs are made by stamping machines. The desired figure which the face of the button is to assume is cut in the upper die, the reverse being made in relief on the underside. Materials used in making buttons include gold, silver, glass, porcelain, horn, bone, india rubber, mother-of-pearl, and various woods. In preparing the sheet-iron for metal and metal-covered buttons the iron is first scaled by putting it in acid. It is then punched out with the dies. The neck is japanned after being cut, and before the canvas cloth for sewing on is placed in place. The hollow between the top and the shell is then filled with brown paper called button-board. A clothfaced button is made by gluing a piece of cloth cut the exact size into the top of a piece of rubber, or vegetable, or ivory body. This leaves a hard material to protect the edges of the button from wearing. The thread holes are drilled through a knob turned or molded on the back of the body. The edges of cloth-covered buttons are protected by working a corded edge around the upper side.

But' tresses, in architecture, especially Gothic, projections on the outside of the walls of an edifice, extending from the bottom to the top, or nearly, and intended to give additional support to the walls and prevent them from spreading under the weight of the roof. Flying buttresses, of a somewhat arched form, often spring from the top of the ordinary buttresses, leaning inward so as to abut against and support a higher portion of the building, such as the wall of a clear-story, thus receiving part of the pressure from the weight of the roof of the central pile.

Buty $\hat{\mathbf{r}}$  ic Acid, an acid obtained from butter; it also occurs in perspiration, cod-liver oil, etc. Butyric acid is a colorless liquid, having a smell like that of rancid butter; its taste is acrid and biting, with a sweetish after-taste.

Butyr'ic Ether, a substance obtained from butyric acid with the flavor of pineapples, used in flavoring confectionery, as an ingredient in perfumes, etc.

**Buxton**, a small town in the county of Derby, England, situated in a valley celebrated for its mineral waters. The surrounding scenery is fine, and there is a vast stalactite cavern called Poole's Hole in the neighborhood. Pop. 7,424.

**Buz'zard**, the name of raptorial birds which form one of the subfamilies of the diurnal birds of prey; characteristics, a moderate-sized beak, hooked from the base, long wings, long tarsi, and short weak toes. The common buzzard is distributed over the whole of Europe as well as the north of Africa and America. Its food is very miscellaneous, and consists of moles, mice, frogs, toads, worms, insects, etc. It is sluggish in its habits. Its

length is from 20 to 22 in. The roughlegged buzzard, so called from having its legs feathered to the toes, is also a native of Britain. Its habits resemblethose of the common buzzard. The red-tailed hawk of the U.S. is a It buzzard. is also called hen hawk, from its raids on the poultry yard. The genus Pernis,



Byron

Common Buzzard.

to which the honey buzzard belongs, has the beak rather weaker than *Buteo* but does not differ much from that genus. The honey buzzard is so called because feeding specially on bees and wasps.

**By-law** (bye-law), a law made by an incorporated or other body for the regulation of its own affairs, or the affairs entrusted to its care. Town councils, railway companies, etc., enact by-laws which are binding upon all coming within the sphere of the operations of such bodies. By-laws must of course be within the meaning of the charter of incorporation and in accordance with the law of the land.

By'ron, George Gordon Noel, Lord Br-RON (1788-1824), a great English poet. Till the age of seven he was entirely under the care of his mother, and to her injudicious indulgence the waywardness that marked his after career has been partly attributed. On reaching his seventh year he was sent to the grammar school at Aberdeen, and four years after, in 1798, the death of his grand-uncle gave him the titles and estates of the family. Mother and son then removed to Newstead Abbey, the family seat, near Nottingham. Soon after Byron was sent to Harrow, where he distinguished himself by his love of manly sports and his undaunted spirit. While yet at school he fell deeply in love with Miss Chaworth, a distant cousin of his own. But the lady slighted the homage of the Harrow schoolboy, her junior by two years, and married another and more mature suitor. In The Dream Byron alludes finely to their parting interview. In 1805 he was entered at Trinity College, Cambridge. Two years after, in 1807, appeared his first poctic volume, Hours of Idleness, which, though indeed containing nothing of much merit, was castigated with severity by Brougham in the Edinburgh Review. This caustic critic roused the slumbering energy in Byron, and drew from him his first really notable effort, the cele-brated satire, English Bards and Scotch Reviewers. In 1809, in company with a friend, he visited

the southern provinces of Spain, and voyaged along the shores of the Mediterranean. The fruit of these travels was the fine poem of Childe Harold's Pilgrimage, the first two cantos of which were published on his return in 1812. The poem was an immense success, and Byron "awoke one morning and found himself fa-His acquaintance was now much mous." courted, and his first entry on the stage of public life may be dated from this era. During the next two years (1813-14) The Giaour, The Bride of Abydos, The Corsair, Lara, and The Siege of Corinth showed the brilliant work of which the new poet was capable. Byron married Anna Isabella, only daughter of Sir Ralph Milbanke; but the marriage turned out unfortunate, and in about a year Lady Byron having gone on a visit to her parents, refused to return, and a formal separation took place. This rupture produced a considerable sensation, and the real cause of it has never been satisfactorily explained. It gave rise to much popular indignation against Byron, who left England, with an expressed resolution never to return. He visited France, the field of Waterloo and Brussels, the Rhine, Switzerland, and the north of Italy, and for some time took up his abode at Venice, and latterly at Rome, where he completed his third canto of Childe Harold. Not long after appeared The Prisoner of Chillon, The Dream, and Other Poems; and in 1817 Manfred, a tragedy, and The Lament of Tasso. From Italy he made occasional excursions to the islands of Greece, and at length visited Athens, where he sketched many of the scenes of the fourth and last canto of Childe Harold. In 1819 was published the romantic tale of Mazeppa, and the same year was marked by the commencement of Don Juan. In 1820 appeared Marino Faliero, Doge of Venice, a tragedy; the drama of Sardanapalus; the Two Foscari, a tragedy; and Cain. a mystery. After leaving Venice Byron resided for some time at Ravenna, then at Pisa, and lastly at Genoa. At Ravenna he became intimate with the Countess Guiccioli, and when he removed to Pisa, in 1822, she followed him. There he continued to occupy himself with literature and poetry, sustained for a time by the companionship of Shelley, one of the few men whom he entirely respected and with whom he was quite confidential. Besides his contributions to the Liberal, a periodical established at this time in conjunction with Leigh Hunt and Shelley, he completed the later cantos of Don Juan, with Werner, a tragedy, and The De-formed Transformed, a fragment. These are the last of Byron's poetical efforts. In 1823, troubled perhaps by the consciousness that his life had too long been unworthy of him, he conceived the idea of throwing himself into the struggle for the independence of Greece. In January, 1824, he arrived at Missolonghi, was received with the greatest enthusiasm, and immediately took into his pay a body of 500 Sulicities. The disorderly temper of these troops, and the difficulties of his situation, together with the malarious air of Missolonghi, began to affect his health. On April 9, 1824,

while riding out in the rain, he caught a fever, which ten days later ended fatally. Thus, in his thirty-seventh year, d. prematurely a man whose natural force and genius were perhaps superior to those of any Englishman of his time, and, largely undisciplined as they were, and wasted by an irregular life, they acquired for him a name second, in the opinion of continental Europe at least, to that of no other Englishman of his time. The body of Byron was brought to England and interred near Newstead Abbey.

Byron, HENRY JAMES (1834-1884), English dramatist and actor. He wrote an immense number of pieces, including a great many farces, burlesques, and extravaganzas, besides comedies or domestic dramas, such as Cyril's Success; Dearer than Life; Blow for Blow; Uncle Dick's Darling; The Prompter's Box; Partners for Life; and Our Boys, which had an extraordinary success.

Byzan'tine Art, a style which arose in Southeastern Europe after Constantine the Great had made Byzantium the capital of the Roman Empire (330 A. D.), and ornamented that city, which was called after him, with all the treasures of Grecian art. See Byzantine One of the chief influences in By-Empire. zantine art was Christianity, and to a certain extent Byzantine art may be recognized as the endeavor to give expression to the new elements which Christianity had brought into the life of men. The tendency toward Oriental luxuriance and splendor of ornament now quite supplanted the simplicity of ancient taste. Richness of material and decoration was the aim of the artist rather than purity of conception. Yet the classical ideals of art, and in particular the traditions of technical processes and methods carried to Byzantium by the artists of the Western Empire, held their ground long enough, and produced work pure and powerful enough, to kindle the new artistic life which began in Italy with Cimabue and Giotto.

With regard to sculpture the statues no longer displayed the freedom and dignity of ancient art. The true proportion of parts, the correctness of the outlines, and in general the severe beauty of the naked figure, or of simple drapery in Greek art, were neglected for extravagant costume and ornamentation and petty details. Yet in the best period of Byzantine art, from the sixth to the eleventh century, there is considerable spiritual dignity in the general conception of the figures. But sculpture was of second-rate importance at Byzantium, the taste of those times inclining more to mosaic work with the costliness and brilliant colors of its stones. The first germ of a Christian style of art was developed in the Byzantine *pictures*. The artists, who appear to have seldom employed the living model, and had nothing real and material before them, but were obliged to find, in their own imaginations, conceptions of the external appearance of sacred persons, such as the mother of Christ or the apostles, could give but feeble renderings of their ideas. As they cared but



### **Byzantine** Empire

little for a faithful imitation of nature, but were satisfied with repeating what was once acknowledged as successful, it is not strange that certain forms, approved by the taste of the time, should be made, by convention, and without regard to truth and beauty, general models of the human figure, and be transmitted as such to succeeding times. In this way the artists in the later periods did not even aim at accuracy of representation, but were contented with stiff general outlines, lavishing their labor on ornamental parts.

Byzantine architecture may be said to have



dome. The last is the most conspicuous and characteristic object in Byzantine buildings, and the free and full employment of it was arrived at when by the use of pendentives the architects were enabled to place it on a square apartment instead of a circular or polygonal. In this style of building incrustation, the incrustation of brick with more precious materials, was largely in use. It depended much on color and surface ornament for its effect. and with this intent mosaics wrought on grounds of gold or of positive color are pro-fusely introduced, while colored marbles and stones of various kinds are greatly made use of. The capitals are of peculiar and original design, the most characteristic being square and tapering downward, and they are very varied in their decorations. Byzantine architecture may be divided into an older and a newer style. The most distinctive feature of the latter is that the dome is raised on a perpendicular circular or polygonal piece of masonry (technically the *drum*) containing windows for lighting the interior, while in the older style the light was admitted by openings in the dome itself. The Cathedral of Athens is an example of the new Byzantine style. The Byzantine style had a great influence on the architecture of Western Europe, especially in Italy, where St. Mark's in Venice is a magnificent example, as also in Sicily. It had also material influence in Southern France and Western Germany.

particular the

Byzantine Empire, also called the Eastern

#### **Byzantine Empire**

Empire, but properly so designated only after the re-establishment of the Western, or Holy Roman Empire, in the year 800. Other names by which it is known are Greek Empire, and Lower Empire. The existence of the Byzantine Empire as a separate dynasty lasted nearly 1,000 years, from the death of Theodosius the Great, 305 A. D., to the fall of Constantinople, 1453. The origin of the empire dates back to 330 A. D., when Constantine the Great removed the capital of the Roman Empire from Rome to the then unimportant town of Byzantium, on the Bosporus. This act was due partly to the fact that Constantine's conversion to Christianity had made the atmosphere of pagan Rome less congenial than that of the East, where the new religion had made great progress; partly to the fact that the center of population, wealth, and culture had moved eastward, owing to the Roman conquests on the one hand and the barbarian inroads on the other. The colony grew rapidly, and in honor of its founder the name of the imperial city was changed to Constantinople. For sixty-five years this city remained the capital of the Roman Empire, although from 364 to 378 the brothers Valentinian and Valens were joint rulers, the former having his court at Milan, the latter at Constantinople. Theodosius the Great (379-395) before his death. divided his dominions between his two sons, Honorius and Arcadius, and the latter became the first of the Byzantine emperors. The dividing line on the west ran southward from Pesth. and followed the Danube eastward to its mouth. The empire also included Asia Minor. the province of Oriens, or Syria, on the eastern shore of the Mediterranean, and Egypt, besides numerous islands, and for a time the southern part of Italy and a portion of Sicily. Its territory was gradually diminished by Asiatic invasion and conquest, until just before its final fall it embraced scarcely more than the capital city and its suburbs. Until the fall of Rome (476) the Byzantine emperors were busied in suppressing the uprisings of their Gothic allies and defending their dominions from invading hordes of Goths, Huns, and Vandals. Frequently they purchased safety by diverting the attention of the barbarians to the provinces of the Western Empire.

During the reign of Theodosius II (408-450) the regency was secured (415) by his sister, the Princess Pulcheria, and retained even after he reached his majority. Under the title of Augusta she gave the empire an able administration, carrying on a successful war against the Persians, and recovering for Valentinian III the Western Empire, in return for which service the Byzantine territory received cessions to the westward. The ravages of Attila and the Huns in Thrace and Macedonia were averted only by the payment of annual trib-ute. On the death of Theodosius (450) Pulcheria was called to the throne, the first woman to enjoy this dignity. She wedded Marcian, whose successful reign continued four years after the death of his remarkable wife (450-457). Leo I, a hitherto almost unknown Thracian, succeeded, the coronation being for the first time performed by the Christian clergy. He assisted in the defense of Rome against the Vandals, and became very popular in the West. His successor, Zeno the Isaurian (474-491), was driven from his capital by Basilicus, but regained the throne. His empire was threatened by Theodoric and the Goths, but the peril was averted by large presents, and the invaders were induced to march westward to Italy. During Zeno's reign occurred the disastrous fire at Constantinople, by which the library. with more than 100,000 manuscripts of classical literature, was destroyed. Anastasius (401-518) built the famous "long walls" across the peninsula, to protect Constantinople from the inroads of the Bulgarians.

Justin I (518-27) was succeeded by his nephew, the famous Justinian I (527-65), under whom the Byzantine Empire enjoyed the most glorious period of its existence, known in history as the "Era of Justinian." His conquests were due to his renowned General Belisarius, one of the great commanders of the world's history, whose services were most shamefully rewarded by his ungrateful emperor. The empire of the Vandals, in Northern Africa, was completely destroyed (533), and an immense province restored to the Christians. The Persians were defeated at the Euphrates. Sardinia, Corsica, and the Balearic Isles were added. Under Narses, a general only less famous than Belisarius, Italy was wrested from the Ostrogoths (555) and again became a part of the empire, being governed by a Greek exarch, whose residence was Ravenna. Justinian's reign is marked by the construction of fortifications, public works, and splendid buildings, among them the great church of St. Sophia. A most important incident of his reign was the introduction of silk manufacture from Asia, ever since a most valuable industry of Southern Europe. The chief monument for posterity of Justinian's reign is the Corpus Juris Cirilis, the "Body of the Roman Law," famous in all time as the Code of Justinian. It includes all the law knowledge of ancient Rome. His unfortunate successor, Justinus II (565-578) was harassed on one frontier by the Persians, on the other by the terrible Avars. Most of Italy was lost to the Lombards. In this reign an alliance was made with the Turks beyond the Caspian against the Persians. The reign of Heraclius (610-641) presents a series of overwhelming reverses retrieved by glorious vic-tories. The Persians, under Chosroes II, took Syria, Palestine, and Asia Minor, and the invading hordes advanced to a point within sight of Constantinople. Shrewdly gaining time by a humiliating treaty. Heraclius col-lected his forces and inflicted a defeat upon the Persians at Issus. The war with the Persians continued four or five years, until finally ended by the terrible battle of Nineveh, 627.

The Moslem hordes of Arabs under Mohammed and his successors appeared next. Between 635 and 641 Syria, Judea, and all the African possessions were lost. What remained, however, was more closely united than before. and from this time the empire became distinctly Greek in character. The dynasty of Heraclius ended with Justinian II, assassinated 711. The seventh and eighth centuries witnessed a peculiar internal religious controversy, which greatly weakened the defense of the Byzantines against their foreign foes. This was the war of the Iconoclasts, most violent under Leo III, the Isaurian (718-741), himself an ardent Iconoclast. The "Image Breakers," as they were called, violently opposed the presence of images in the churches, and the result was the separation of the Greek Church in the latter half of the ninth century from the mother church, henceforth known as the Roman Catholic Church. The formal separation, however, did not occur until the excommunication of the Greek Church, 1054. Leo's position on this question ended the Byzantine rule in Italy (728). Leo's successor, Constantine V (741-55), was also a zealous Iconoclast, and closed many monasteries and convents. Image-worship was restored for a brief period by the Empress Irene, who had obtained the throne by blinding her own son, Constantine VI, for whom she was guardian (707). She was ambitious to marry Charlemagne and thus reunite the Eastern and Western Empires, but her plan was not supported. During the reign of Leo V (813-20) the Bulgarians overran Thrace and laid siege to Constantinople, but were finally repulsed. The Saracens cap-tured Crete and Sicily (824-27). Under Michael III (842-67), who reigned first under the guardianship of his mother, Theodora, the images were finally restored in the Greek Church (842). But other differences had arisen which led to the separation noted above. The Russians now first appear as enemies of the Empire. The Macedonian dynasty (867-1057) was founded by Basil I, during whose reign pire. the Saracens conquered Sicily and ravaged the Peloponnesus. His son, Leo II, the Philosopher (886-911), called in the Turks to aid against the Saracens, and thus the former paved the way for future conquests. In the middle of the tenth century, during the reign of Constantine VII (911-59) Russian and Hungarian princes were baptized at Constanti-nople, married Christian wives, and carried the gospel to their peoples. Under Basil II (976-1025) the Bulgarian kingdom was overthrown, and that country became a Greek province (1018), remaining so until 1186. About the middle of the eleventh century the Seljuk Turks became threatening, and in Italy the Byzantine possessions were nearly all seized by the Normans. Isaac, the first of the Comneni, reigned 1057-50. Under his successors the inroads of the Seljuks became more frequent. and by 1078 they had conquered nearly all of Asia Minor.

The steady advance of the Mohammedan power alarmed all Christian Europe, and during the reign of Alexis Comnenus (1081-1118), began the wonderful movement of allied Christendom known as the Crusades. As the hosts



#### **Byzantine Empire**

marched toward Asia Minor via Constantinople the movement could not but have an important influence on the fortunes of the Byzantine Empire. Alexis wanted help against the Turks, but the vast numbers that came alarmed him, and their depredations within his territory led to serious conflicts, and finally under later emperors to open hostility. With the second Crusade Alexis made a treaty, he agreeing to furnish troops, they to hold any conquests as fiefs of the empire, but neither party kept faith. During this period the Normans, under Robert Guiscard and his son Bohemond, attacked the western frontier, but finally made peace. Manuel Comnenus (1143-80) was victorious over the sultan of Iconium and Raymond of Toulouse, the Christian prince of Antioch. The son of Isaac II (1185-95), who had been dethroned by Alexis III (1195-1203), asked aid of the Crusaders, who captured Constantinople (1203) and restored Isaac. He and his son were put to death the next year, and in April, 1204, the city was again taken by the Crusaders, who established the Latin Empire of Roumania (1204-61), with Count Baldwin of Flanders as first emperor. The empire was cut up into various kingdoms, duchies, and flefs, divided among the French and Venetians. Boniface of Montferrat received the kingdom of Thessalonica, including Macedonia and part of Greece, Venice, the lands along the Adriatic and the Ægean, also Crete and Eubœa. Athens and Bœotia were made a duchy. In Asia Minor the Greek Empire survived, and the capital was located at Nicæa, with Theodore Lascaris as emperor. With the aid of the Bulgarians the Greeks defeated Baldwin (1206). The latter's successor, Henry, was successful against the allies, and made peace with the Byzantines. Jean de Brienne (1228-37), titular king of Jerusalem, ruled as regent for Baldwin II, and saved Constantinople from an attack of the allied Bulgarians and Greeks. Finally in 1261 the emperor of Nicea, Michael Palæologus, with the aid of the Genoese navy (Genoa being the hated rival of Venice), captured Con-stantinople. The Latin Empire now vanished, but many of the principalities remained.

Michael (1261-82), founded the dynasty of the Palcologi, which lasted until 1453. He made fruitless efforts to reunite the Greek and the Latin churches. His son, Andronicus II (1282-1328), hired Catalan troops to aid in repelling the Turks, but in the following reign they took Nicæa and Nicomedia (1339). In 1361 the Sultan Amurath took Adrianople, and afterward conquered Macedonia and part of

#### Byzantium

Albania, whereupon the emperor John (1341-91) acknowledged himself his vassal and agreed to pay tribute. Bajazet, the successor of Am-urath, took Philadelphia in Asia Minor and later besieged Constantinople. In 1400 he was again before the city, when the invasion of the Turkish Empire by the Tatar hordes under Tamerlane called him back to Asia. During this time and the internal quarrels among the Turks after the death of Bajazet, the emperor Manuel (1391-1425) regained some of the lost ground, but in 1422 Amurath II appeared before Constantinople; Turkish quarrels, how-ever, once more saved the city. In this siege cannon were for the first time used in Eastern wars. Manuel's successor, John VI (1425-48), tried to effect a reconciliation of the churches, hoping for a crusade in his behalf. At the Council of Florence a reunion was actually proclaimed, but it was never effected and was without political results. By 1444 Amurath had taken all but the city and suburbs of Constantinople, and these he generously allowed the emperor to enjoy during the remainder of his life. On John's death, his brother Constantine XIII (1448-53) appealed to the West for aid, but with insignificant result. The Turks attacked Constantinople April 6, 1453, with an army of 400,000 men under Sultan Mohammed II. The brave garrison of 8,000 held out until May 29, when the city was finally taken; Constantine, the last of the Byzantine emperors, falling in the thick of the fight. The surviving inhabitants were sold into slavery, Christianity was exterminated, and on the dome of St. Sophia's the cross was replaced by the Moslem crescent. The various principalities and islands were conquered by 1461, and the last vestige of the Byzantine Empire had disappeared. But it had not existed in vain; for all through the Dark Ages, when the Roman civilization of Western Europe had succumbed to the barbarians, the precious legacy of the ancients was guarded and preserved for the modern world. And furthermore, the Byzantine Empire stood as a bulwark against the barbaric hordes of Asia until the growing nations gathered strength to with-stand their onsets. When we realize that without it, all that was best in the world's past would have been lost, all that is best in modern civilization retarded for hundreds of years, then only is the true significance of the Byzantine

Empire understood. W.A. HERVEY. Byzantium, the original name of the city of Constantinople. See Constantinople.

#### Caaing Whale

C, the third letter in the English alphabet and the second of the consonants. In English it serves to represent two perfectly distinct sounds, namely, the guttural sound pertaining to k and the hard or thin sound of s, the former being that which historically belongs to it; while it also forms with h the digraph ch. The former sound it has before the vowels a, o, and u, the latter before e, i, and y. The digraph chhas three different sounds, as in *church*, *chaise*, and *chord*. To these the Scotch adds a fourth, heard in the word *loch*.

C, in music, 1, after the clef, the mark of common time, in which each measure is a semibreve or four minims, corresponding to  $\xi$  or  $\xi$ ; and when a bar is perpendicularly drawn through it *alla brere* time or a quicker movement is indicated. 2. The name of the first or keynote of the modern normal scale answering to the *do* of the Italians and the *ut* of the French.

**Caaing Whale** (kä'ing) (Scotch name, meaning "driving whale," whale that may be driven), the round-headed porpoise, a cetaceous animal of the dolphin family, characterized by a rounded muzzle and a convex head, attaining a size of 16 to 24 ft. It frequents the shores of



#### Caaing Whale.

Orkney, Shetland, the Faroe Islands, and Iceland, appearing in herds of from 200 to 1,000, and numbers are often caught. They live on cod, ling, and other large fish, and also on molluscs, especially the cuttle fishes.

**Caballero** (kå bå-lyer'ō), FERNAN (1797-1877), pseudonym of Cecilia Böhl von Faber, the chief modern Spanish novelist. Her first novel, *La Gaviota*, appeared in 1849, and was followed by *Elia*, *Clemencia*, *La Familia de Alvareda*, etc., as well as by many shorter stories. The chief charm of her writings lies in her descriptions of life and nature in Andalusia.

**Cabatuan'**, a town on the island of Panay, one of the Philippines. It was founded in 1732, and has considerable trade. Pop. 23,000.

#### Cabinet

**Cabaze'ra**, a town in the island of Luzon. Philippines. It is the capital of the province of Cayagan and has some trade in tobacco. Pop. 30,016.

Cabbage, the popular name of various species of cruciferous plants of the genus Brassica, and especially applied to the plain-leaved, hearting, garden varieties cultivated for food. The wild cabbage is a native of the coasts of Britain, but is much more common on other European shores. The kinds most cultivated are the common cabbage, the savoy, the broc-coli, and the cauliflower. The common cabbage forms its leaves into heads or bolls, the inner leaves being blanched. Its varieties are the white, the red or purple, the tree or cow cabbage for cattle (branching and growing when in flower to the height of 10 ft.), and the very delicate Portugal cabbage. The garden sorts form valuable culinary vegetables, and are used at table in various ways. In Germany pickled cabbage forms a sort of national dish, known as sauerkraut. The cow cabbage, which grows in New Jersey, attains gigantic proportions for a vegetable, and the stalks, which frequently grow to heights of 12 ft. and 16 ft., are used as rails for fences, and as rafters for the thatched roofs of farm buildings; while shorter ones are made into umbrella handles and walking sticks, which are much in request as curiosities among tourists. This sort of cabbage was introduced by Mr. Fullard, and was asserted by that gentleman's cowherd to be so prolific that five plants of it per day are, with proper management, sufficient for 10 oxen or 100 sheep. The largest cabbage farm in the world is to be found at Chicago, U. S., in a district known as the cabbage prairie; its area is 190 acres, upon which are raised 1,114,000 cabbages annually.

**Cabbage Paim**, a name given to various species of palm trees from the circumstance that the terminal bud, which is of great size, is edible and resembles cabbage. As the Arēca oleracēa, a native of the West India, the simple unbranched stem of which grows to a height of 150 or even 200 ft. The unopened bud of young leaves is much prized as a vegetable, but the removal of it completely destroys the tree, as it is unable to produce lateral buds.

**Cabbage Rose,** a species of rose of many varieties, supposed to have been cultivated from ancient times, and eminently fitted for the manufacture of rose water and attar from its fragrance. It has a larger, rounded, and compact flower. Called also *Provence Rose.* 

**Cab** inet, the collective body of ministers who direct the government of a country. In the U. S. the cabinet consists of the secretary of state, the secretary of the treasury, the secretary of war, the secretary of the navy, the secretary of the interior, the attorney general.

the postmaster general, and the secretary of agriculture. These are the heads of their respective departments, and in their collective capacity act as advisory board to the president. They are appointed to office by the president, but their appointments must be confirmed by the senate, and they generally hold office until their successors are appointed and confirmed. Contrary to the English system, the U. S. cabinet ministers must not have seats in Congress; there is no premier, and the president, not the ministers, is responsible for the acts of the government. The salary of members of cabinet is \$8,000 a year.

The word cabinet is used for analogous institutions in other countries. In England. though the executive government is vested nominally in the crown, it resides practically in a committee of ministers called the *cabinet*. Every cabinet includes the first lord of the treasury, who is usually (not always) the prime minister or chief of the ministry, and therefore of the cabinet; the lord chancellor, the lord president of the council, the chancellor of the exchequer, the first lord of the admiralty, and the five secretaries of state. Although the cabinet is regarded as an essential part of the institutions of Great Britain, it has never been recognized by act of Parliament. It began to take its present form in the reign of William III.

Cable, a large strong rope or chain, such as is used to retain a vessel at anchor. It is made usually of hemp or iron, but may be made of other materials. A hemp cable is composed of three strands, each strand of three ropes, and each rope of three twists. A ship's cable is usually 120 fathoms or 720 ft. in length; hence the expression a cable's length. Chain cables have now almost superseded rope cables. Although deficient in elasticity, heavier, and more difficult of management, yet their immunity from chafing and rotting, their greater compactness for stowage, and the fact that from their greater weight the strain is exerted on the cable rather than on the ship, more than counterbalance these drawbacks. Compared with the strength of hempen cable, 1 in. diameter chain cable is equivalent to 101 in. circumference hemp, 11 in. to 131 in., 11 in. to 16 in., 12 in. to 18 in., and 2 in. to 24 in.

**Cable,** THE ATLANTIC, for submarine communication of messages between America and England. While the biography of Cyrus W. Field graphically portrays the trials, failures, and ultimate triumph of submarine telegraphy, some practical details and particulars are necessary in regard to this greatest of modern achievements.

Professor Morse of New York was the first to experiment with a cable from Castle Garden to Governor's Island, in 1842. Then, in 1854, Cyrus W. Field took up the project and organized a company, capitalized at \$1,750,000. The first attempt to lay the cable, Aug. 7, 1857, resulted in a failure and the loss of 280 ml. of cable. In 1858, on a second attempt, 144 mi. of cable were lost, and on August 6 in that year the first completed cable flashed from Valentia to Newfoundland the inspiring message, "Europe and America are united by telegraph; glory to God in the highest: on earth, peace and goodwill toward men." The triumph was brief. One hundred twenty-nine messages were sent from England and 271 from America when the cable refused to work. For six years ridicule alternated with failure. Then the giant steamer, the Great Eastern, was employed, and. after some failures, in 1866 succeeded in laying a new cable, and recovering and placing in operation a cable which had broken the previous year. To-day eleven transatlantic cables are in operation. The commercial cables of the world number 310, with an aggregate mileage of 139.754. The governmental cables of the various powers number 994, with a mileage of 18,132. The cables are insulated by gutta-percha wrappings and reinforced by surrounding wires. In the Mediterranean they are constantly suffering from the attacks of the ship worm (which see), and on the Atlantic plateau are subject to some disturbance from fouling by the anchors of the fishing fleets.

A submarine telegraph cable is composed of one or more copper wires embedded in a compound of gutta-percha and resinous substances, encircled by layers of gutta-percha or india-rubber, hemp or jute padding, and coils of iron wire. In the process of manufacture the cable is tested at every step by expert elec-In the very center of the cable are copper wires. This strand of wires tricians. seven fine copper wires. is first drawn over an adhesive black mixture and then through a machine which coats it with gutta-percha which acts as insulating material. Four coats of gutta-percha are put on the copper center, and the core is then coiled in an iron tank, covered with water and tested to find whether it is electrically sound. It is then wrapped with tarred jute. Another machine covers the jute with steel or iron wires, twisting them around the jute to envelop the core. Over this a canvas which has been soaked in asphaltum is wrapped, and again the cable is put to a test. It is coiled in tanks and covered with water, where it remains while very delicate electrical tests are made. It is then ready to be put on board the ship which is to lay it in the ocean. In the hold of the ship are large steel tanks around which the cable is coiled. The cable is hauled into the ship over the drum of a large hoisting machine. It glides over steel rollers in the bottom of a trough which lies on the deck, and dives down in the hold of the vessel. The cable is then ready to be laid in the ocean. Over the bow of the ship hangs a deeply grooved iron pulley called the bow-sheave. Back of the bow-sheave is a dynamometer which indicates the strain upon the cable. In the stern of the vessel is the paying-out gear. The submarine cable after first being passed several times around the drum of the payingout gear is attached to a hemp cable. The picking-up gear draws in the hemp cable over the bow, and thus pulls the cable ashore. As the cable slips over the stern, sailors fasten air balloons to it at intervals of 50 to 60 ft. These

27

Cable

balloons serve to keep the cable from being dragged to the bottom or chafed by rocks. When the end of the cable has been made fast on shore, the cable steamer heads for the ocean, leaving a wake of submarine cable as it moves along.

**Cable**, GEORGE WASHINGTON, a popular American author, was b. in New Orleans in 1844. He volunteered into the Confederate service. He saw some hard service, and in one action was severely wounded. After the war he was laid up with malarial fever caught at survey work on the Atchafalaya River. During his two years' illness he began to write for the New Orleans papers, and his success ere long was such as to encourage him to de-vote himself to the literary craft. His sketches of Creole life revealed to the world an interesting phase of American social life hitherto unknown. His keen observation and dextrous literary use of the Creole dialect at once found him a public on both sides of the Atlantic. Among his books are Old Creele Days (1879), The Grandissimes (1880), Madame Delphine (1881), Dr. Serier (1883), The Creoles of Louisiana (1884), The Silent South (1885), Bonarenture (1888), Strange True Stories of Louisiana (1880), and The Negro Question (1890). Cable has lectured with success on his chosen subject, and has had the happiness to see important reforms in contract convict labor in the Southern states brought about mainly through his own pen.

**Cab** ot, SEBASTIAN (1474-1557), a noted navigator. He was the son of John Cabot, a Venetian pilot, who resided at Bristol, and was highly esteemed for his skill in navigation. In 1497, in company with his father and two brothers, he discovered the mainland of North America, having visited Nova Scotia and Newfoundland. In 1517 he made an attempt to discover the northwest passage, visiting Hudson's Bay. In 1520, when in the Spanish service, he visited Brazil and the river Plata. In 1548 he again settled in England, and received a pension from Edward VI. He was the first who noticed the variations of the compass; and he published a large map of the world.

**Cabral'**, PEDRO ALVAREZ (1460-1526), the discoverer (or second discoverer) of Brazil, a Portuguese. In 1500 he received command of a fleet bound for the East Indies, and sailed from Lisbon, but having taken a course too far to the west he was carried by the South American current to the coast of Brazil, of which he took possession in name of Portugal. Continuing his voyage, he visited Mozambique, and at last reached India, where he made important commercial treaties with native princes, and then returned to Europe.

**Cabul** (Cabool, Kabul) (kä-bul'), capital of Afghanistan, 165 mi. from Peshawur, 600 from Herat, and 290 from Candahar. It stands on the Cabul River, at an elevation of 6,400 ft. above sea level. The citadel, Bala-Hissar, contains the palace and other public buildings, the fort, etc. Cabul carries on a considerable trade with Hindustan through the Khyber Pass. It was taken by the British in 1839 and in 1842, and on the occasion of a subsequent war with the British in 1879 Cabul was twice taken by their troops. Pop. 75,000. The Cabul River rises in Afghanistan at the height of about 8,400 ft., flows eastward, passes through the Khyber Pass into India, and falls into the Indus at Attock. Length 300 mi.

**Caca'o** (or Co'coa), the chocolate tree and also the powder and beverage made with it obtained from the fruit of this tree. The tree is 16 to 18 ft. high, a native of tropical America, and much cultivated in the tropics of both hemispheres, especially in the West India Islands, Central and South America. Its fruit is contained in pointed, oval, ribbed pods 6 to 10 in. long, each enclosing 50 to 100 seeds in a white, sweetish pulp. These are very nutritive, containing 50 per cent. of fat. are of an agreeable flavor, and used, both in their fresh state and when dried, as an article



a.-branch with leaves; b.-fruit (partly in section).

of diet. Cocoa and chocolate are made from them, the former being a powder obtained by grinding the seeds, and often mixed with other substances when prepared for sale, the latter being this powder mixed with sugar and various flavoring matters and formed into solid cakes. The seeds when roasted and divested of their husks and crushed are known as cocoa niks. The seeds yield also an oil called butter of cacao, used in pomatum and for making candles, soap, etc. The term cocoa is a corruption of cacao, but is more commonly used in commerce; cocoa-nuts, however, are obtained from an entirely different tree.

**Cachar'**, an East Indian district in Assam; area 3,750 sq mi.; pop. 313,858, entirely engaged either in rice cultivation or on the tea plantations.

**Cacique** (ka-sēk), in some parts of America the title of the native chiefs at the time of the conquest by the Spaniards.

**Cactus**, a Linnæan genus of plants, now used as a name for any of the Cactaceæ, a nat-

#### Cadomosto

ural order of dicotyledons, otherwise called the Indian fig order. The species are succulent shrubs, with minute scale-like leaves (except in the genus *Pereskia*, tree cactus, with large leaves), and with clusters and spines on the stems. They have fleshy stems, with sweetish watery or milky juice, and they assume many peculiar forms. The juice in some species affords a refreshing beverage where water is not



#### Cacti.

a.-Cereus giganteus; b.-Opuntia coccinellifera; c.-Mammiliaria pectinata; d.-Phyllocactus anguliger.

to be got. All the plants of this order, except a single species, are natives of America. They are generally found in very dry localities. Several have been introduced into the Old World, and in many places they have become naturalized. The fruits of some species are edible, as the prickly pear, and the Indian fig, cultivated throughout the Mediterranean region. The flowers are usually large and beautifully colored, and many members of the order are cultivated in hot-houses.

**Cadomosto**, ALOIS DA (1432-1464), an early navigator. He explored the west coast of Africa as far south as the Gambia. His Book of the First Voyage over the Ocean to the Land of Negroes in Lower Ethiopia was published in 1507.

**Cadas' tral Survey**, a detailed survey of the lands of a country, their extent, divisions, and subdivisions, nature of culture, etc., in most countries executed by the government as the basis of an assessment for fiscal purposes.

**Caddis Fly**, an insect, called also the May fly, the larva or grub of which (caddis or case worm) forms for itself a case of small stones, grass roots, shells, etc., lives under water till ready to emerge from the pupa state, and is used as bait by anglers. This grub is very rapacious, and devours large quantities of fishspawn.

**Cade**, JOHN (better known as Jack Cade), a popular agitator in England of the fifteenth century, was the leader of an insurrection which broke out in 1450. Yeomen and tradesmen formed the bulk of the insurgents. The rebellion was *political*, not *social*, like that headed by Wai Tyler. C. defeated a detachment of troops sent against him, and even ruled London for two days, causing one of the king's favorites, Lord Say, to be beheaded. A promise of pardon caused his followers to disperse. C. then fled, but was followed and killed.

**Ca' dence**, the concluding notes of a musical composition or of any well-defined section of it. A cadence is *perfect*, *full*, or *authentic* when the last chord is the tonic preceded by the dominant; it is *imperfect* when the chord of the tonic precedes that of the dominant; it is *plagal* when the closing tonic chord is preceded by that of the subdominant; and it is *interrupted*, *false*, or *deceptire* when the bass rises a second, instead of falling a fifth. Cadence, or *cudenza*, is the name also given to a running passage which a performer may introduce at the close of a movement.

**Cader Idris**, a mountain mass about 10 mi. long in Merionethshire, Wales. The highest peak is 2,914 ft. above the level of the sea.

**Cadet** (Fr., through some low Lat. diminutive form, from Lat. caput, "head") is a term applied in a general sense to the younger son of a noble house as distinguished from the elder; and in France, any officer junior to another is a cadet in respect to him. The term is generally applied to a youth studying for the army at one of the military colleges or for the navy. In the U. S., pupils at the West Point Military Academy and at the Naval Academy at Annapolis are termed cadets.

Of British military cadets, those destined for the Royal Artillery or Royal Engineers study at the Royal Military Academy, Woolwich, and those for other branches of the service at the Royal Military College, Sandhurst.

**Cadiz** (kä-deth'), a seaport of Spain. It is well built, well paved, and very clean, and is strongly fortified. The chief buildings are the great hospital, the customhouse, the old and new cathedrals, the theaters, the bull ring, capable of accommodating 12,000 spectators, and the lighthouse of St. Sebastian. The bay of Cadiz is a large basin enclosed by the mainland on one side, and the projecting tongue of land on the other, with good anchorage, and protected by the neighboring hills. It has four forts, two of which form the defense of the grand arsenal, La Carraca (4 mi. from Cadiz), at which are large basins and docks. Cadiz has long been the principal Spanish naval station. Its trade is large, its exports being especially wine and fruit. Cadiz was founded by the Phonicians about B. C. 1100, and was

## Cadmium

one of the chief seats of their commerce in the west of Europe. Pop. 62,531. The province of Cadiz is the most southerly in Spain; area 2,809 sq. mi.; pop. 429,872.

**Cad' mium**, a scarce metal which resembles tin in color and luster, but is a little harder. It is very ductile and malleable, and fuses a little below ared heat. In its chemical character it resembles zinc. It occurs in the form of carbonate, as an ingredient in various kinds of calamine, or carbonate of zinc. It is also found in the form of a sulphide, as the rare mineral greenockite. It forms at least two oxides, one chloride, and one sulphide.

**Cadmus,** in Greek legend, the son of Agenor, and grandson of Poseidon (Neptune). He was said to have come from Phœnicia to Greece about 1550 B. c., and to have built the city of Cadmea, or Thebes, in Bœotia. Herodotus and other writers ascribe the introduction of the Phœnician alphabet into Greece to Cadmus. The solar mythists identify him with the sun-god.

**Cadore** ( $k\dot{a}$ -d $\delta$ ' $r\ddot{a}$ ), a small town of Italy, the native place of Titian, the famous artist, who was b. here in 1477.

**Cadu ceus**, Mercury's rod; a winged rod entwisted by two serpents, borne by Mercury as an ensign of quality and office. In modern times it is used as a symbol of commerce, Mercury being the god of commerce. The rod represents power; the serpents, wisdom; and the two wings, diligence and activity.

**Cædmon** (kad'mon), the first Anglo-Saxon of note who wrote in his own language, flourished about the end of the seventh century. He was originally a tenant, or perhaps only a cowherd, on the abbey lands at Whitby, but afterward was received into the monastery. His chief work (if it can all be attributed to him) consists of paraphrases of portions of the Scriptures, in Anglo-Saxon verse, the first part of which bears striking resemblances to Milton's narrative in *Paradise Lost*.

**Caen** (kän), a town of France, in Normandy, chief place in dep. Calvados. It is the center of a rich agricultural district, and carries on extensive manufactures. One of the finest churches is that of St. Pierre, built in 1308. Two other remarkable churches are St. Etienne or church of the Abbaye-aux-Hommes, built by William the Conqueror who was buried in it, and La Ste. Trinité or church of the Abbaye-aux-Dames, founded by the Conqueror's wife. Other buildings are the castle and the hôtel de ville. There is a public library of 60,-000 volumes, and a botanic garden. Lace is largely made here. Valuable building stone is quarried. Pop. 45,201.

**Caen Stone**, a cream-colored building stone of excellent quality, got near Caen in Normandy. Winchester and Canterbury cathedrals, Henry VII's chapel at Westminster, and many other English churches are built of it.

**Cæsalpiniæ**, a subdivision of the natural order of plants Leguminosæ, containing several genera. The typical genus is Cæsalpinia, to which belong the Brazil wood, Japanwood, Nicaragua wood, etc. The Cæsalpinieæ in-

# clude also among their number, senna, the carob, tamarind, aloes wood, logwood, etc.

Cee'sar, a title, originally a surname of the Julian family at Rome, which, after being dignified in the person of the dictator Caius Jt lius Cæsar, was adopted by the successive Roman emperors, and latterly came to be applied to the heir-presumptive to the throne. The title was perpetuated in the *kaiser* of the Holy Roman Empire, and in the *czar* of the Russian emperors.

Cæsar, CAIUS JULIUS (B.C. 100-44), a famous Roman general, statesman, and historian, son of a Roman prætor of the same name. He married Cossutia, a rich lady of good family. from whom he was divorced to marry Cornelia, daughter of Cinna. Refusing to divorce her at the command of Sulla, he was proscribed and compelled to flee from Rome. After the death of Sulla, he returned and again took part in public affairs. He es-poused the cause of the people, and won for himself the highest civil and military honors. The rise of Cæsar was contemporaneous with that of Cicero (67-63). Cæsar's patrician birth, his relationship to Marius and Cinna, combined with his personal talents, won for him the leadership of the popular party. His attempt to procure the Roman franchise for the Latins beyond the Po, secured him the sympathies of the Italians. He was elected Curule



Ædile (66), and increased his popularity by lavish public expenditures and splendid public games. In 63 he tried to gain a commaud abroad, hoping thus to make his own position secure before the return of Pompey. The real object of the agra-

rian law proposed by Rullus (63) was the creation of a commission that would make Cæsar and Crassus nearly, if not quite, equal in power to Pompey himself. Cicero's influence defeated this measure.

Catiline's outbreak (63) brought discredit on all members of the popular party. Cæsar not excepted. The wave of popular indignation which checked Cæsar's career, brought to the front Cicero, whose influence with the "true Roman people" was paramount. The people, fearing the influence of Cæsar, elected Cicero to the consulship (63) over the heads of the Cæsarian nominees. To gain the assistance of his colossal wealth, Cæsar made a coalition with Crassus, who, being inferior in intellect. became a tool to work his superior's will in the accomplishment of his ambition to become master of the Roman world. On Pompey's return to Rome, Cæsar's versatility, aided by the opposition of Pompey's enemies, and the latter's wish to have his arrangements in Asia ratified, and land granted to his troops, won him for an ally. Pompey joined Crassus in supporting Cæsar for the consulship. Just

prior to taking up the duties of his office, Cæsar formed with Pompey and Crassus the so-called "First Triumvirate." Thus was destroyed Cicero's hope of enlisting Pompey as champion of constitutional government. As consul, Cæsar won the favor of the populace by the agrarian law providing for the distribution of land among the poor. He relieved the knights of one third their tax pledges, and gave Pompey his request.

He himself secured military command in the West, where he hoped to make himself a position similar to the one held by Pompey in the East. Having received from the people Cisalpine Gaul with the command of three legions of soldiers, to which the senate added Transalpine Gaul and another legion, he was fairly, launched upon the military career destined to make him master of the Roman world. For nine years he was in Gaul. The final subjugation of Gaul was accomplished in nine campaigns (58-50). Cæsar, in his first campaign (58), defeated the Helvetii, sending the survivors home to cultivate their land, while he overthrew Ariovistus, a German prince. His sec-ond campaign (57) was against the Belgæ in which he defeated four allied tribes united for the defense of Gaul. After wintering at Luca and spending large sums in hospitality, he took the warpath against the Venetii, defeating them totally (56) in his third campaign. His fourth campaign was against two German tribes invading Gaul, whom he defeated and followed across the Rhine. The same year (55) he invaded Britain, and won from the senate a second thanksgiving lasting 20 days. His second invasion of Britain (54) resulted in the subjugation of the Britons. The subjugation was nominal only, as he left no troops to hold the land. Consequently the Britons retained their independence 100 years longer.

His sixth campaign (53) was against revolting Gallic tribes, who were soon reduced to obedience. Cæsar's most brilliant victory (52) was over Vercingetorix, who led a revolt of nearly all the Gallic nations. In the eighth and ninth campaigns (51-50) he accomplished the final subjugation of all Gaul. After the return of Cicero from exile, he became alarmed for the fate of his agrarian law because of the hostility of the senate. A stronger alliance of the three "citizen rulers" was formed at Luca (56) when Cæsar was wintering there. Pompey and Crassus became joint consuls (55), and the control of the Roman world was divided among them. During 54 anarchy was rampant at Rome and Pompey remained at home. After Crassus was slain (53) Pompey was forced into a hostile attitude toward Cæsar. In 52 Pompey being sole consul, and having had his military command prolonged and fresh troops added to his army joined the senatorial party against Cæsar.

Cæsar wished to stand for the consulship (48) without giving up his command. This did not suit his enemies. The discussion continued through 51 and 50. Cæsar's last compromise was rejected Jan. 1, 49. Being ordered to disband his army he answered by promptly crossing the Rubicon. Pompey with the senate and nobles fied to Greece. In three months Cæsar was master of all Italy. He enjoyed his victory but a short time before he hastened to Spain to overthrow Pompey's legates there. On his return from this expedition he was appointed dictator, holding the office but eleven days. In January (48) he followed Pompey into Greece, and defeated him on the plains of Pharsalia, Aug. 9, 48. When the news of this victory reached Rome, Cæsar was appointed dictator for one year, consul for five, and tribune for life.

Before Cæsar again returned to Rome he brought to a successful issue (47) the Alexandrine War undertaken to satisfy the claims of Cleopatra against her brother Ptolemy. Returning through Pontus Cæsar defeated Pharnaces and informed the senate of his victory in the laconic dispatch, "veni, vidi, vici" (I came, saw, conquered). He defeated Scipio at Thespius (46). Cato killed himself at Utica rather than to fall into the hands of this universal conqueror. Now undisputed master of the Roman world, Cæsar showed his greatness by his magnanimity. The dictatorship was bestowed upon him for ten years by a grateful people, and his victories were celebrated by magnificent triumphs. He caused the calendar, which had falled into confusion, to be corrected (46).

After his return from defeating the two sons of Pompey in Spain (45), fresh honors were conferred upon him. He was made Imperator for life, and his portrait was stamped upon the coins of the realm. He proposed many public improvements, such as a digest of the Roman laws, the founding of public libraries, draining the Pontine marshes, enlarging the harbor at Ostia, digging a canal across the isthmus of Corinth, etc. After the crown had been offered Cæsar at Lupercalia, the aristocracy, all of whom had received favors at his hands, con-spired against his life. The twenty-three wounds from which he died, March 15, 44, tell the story of envious swords in the hands of treacherous friends. Thus died a great general. statesman, and orator. The only extant liter-ary monument of this great man's genius is the incomparable account given in his Commentaries of the Gallic and Civil Wars.

**Cæsare'a**, the ancient name of many cities, such as: 1, Cæsarea Philippi in Palestine, north of the Sea of Galilee, rebuilt by Philip, tetrarch of Galilee, son of Herod the Great. 2, Cæsarea, on the shores of the Mediterranean, about 55 mi. n.w. from Jerusalem, enlarged and beautified by Herod the Great, and named in honor of Cæsar Augustus: the place where St. Paul was imprisoned two years (Acts 23-25). 3, The capital of Cappadocia in Asia Minor.

**Cæsa' rean Operation**, a surgical operation, which consists in delivering a child by means of an incision made through the walls of the abdomen and womb; necessary when the obstacles to delivery are so great as to leave no other alternative. It is said to be so named because Julius Cæsar was brought into the world in this way. **Cæsa**' rion, son of Julius Cæsar and Cleopatra, put to death by order of Augustus.

**Cæsium**, a rare metal, first discovered by Bunsen and Kirchoff by spectrum analysis in 1860. It is soft, and of a silver-white color. It is always found in connection with rubidium. It belongs to the same group of elements with lithium, sodium, potassium, and rubidium, viz., the group of the alkali metals.

**Caff'eine** (or the'Ine), the active principle of tea and coffee, a slightly bitter, highly azotized substance, crystallizing in slender, silklike needles, found in coffee beans, tea leaves, Paraguay tea, guarana, etc. Coffee contains from 0.8 to 3.6, and tea from 2 to 4 per cent. Doses of 2 to 10 grains induce violent nervous and vascular excitement.

**Caffre Corn**, a variety of millet. The seed was first brought from the Caffraria country in Africa. It is grown extensively and successfully in the Western states subject to drought.

**Cagliari** (kål'yå-rö), the capital of the island of Sardinia. It is the residence of the viceroy and of an archbishop, and the seat of a university. It has some manufactures, and is the chief emporium of all the Sardinian trade. Pop. 39,312.

Cagliostro (kål-yos' tro), Count Alessandro (real name Giuseppe (Joseph) Balsamo) (1743-1795), a celebrated charlatan. He entered the order of the Brothers of Mercy, where he acquired a knowledge of the elements of chemistry and physic. He committed so many crimes in Palermo that he was obliged to ab-scond. He subsequently formed a connec-He committed so many tion with Lorenza Feliciani, whose beauty, ability, and want of principle made her a valuable accomplice in his frauds. With her he traveled through many countries, pretending to supernatural powers, and wringing considerable sums from those who became his In Paris he was implicated in the dupes. affair of the diamond necklace, which caused so great a scandal in the reign of Louis XVI, and was imprisoned in the Bastile, but escaped. In 1789 he revisited Rome, but being discovered, and committed to the Castle of St. Angelo, he was condemned by the pope to imprisonment for life as a freemason, archheretic, and a foe to religion. He died in prison.

**Cag** ots (kä'gôz'), properly applied to an extinct race of deformed dwarfs among the peasants of the Pyrenees. They were shunned and set apart by their fellow Christians. The priest handed them the wafer at the end of a stick. Only the most repulsive labor was assigned to them by the town authorities, but they were allowed to be carpenters and ropemakers. The Spanish Cagots of Navarre are said to be tall, strong, well-built in person, and of regular features.

**Cahors** (kä-ör), a town in Southern France. Under the Romans it was adorned with a temple, theatre, baths, an immense aqueduct, and forum, remains of which are still to be seen. Among the principal edifices are the cathedral, and an episcopal palace, now converted into the prefecture. It was the birthplace of Gambetta. Pop. 15,369. **Cal'aphas**, a Jew, was the high priest at the time when the crucifixion took place. He was deposed A. D. 35, and Jonathan, the son of Annas, appointed in his stead.

**Caicos** (Cayos, or the Keys) (kľköz, kľóz) (Spanish *Cayo*, a rock or islet), one of the island groups comprehended under the general name of the Bahamas, consisting of six islands besides some uninhabited rocks. The largest, called the Great Key, is about 30 mi. long. The inhabitants are few in number, and mostly engaged in fishing and the preparation of salt. In 1873 the Turks Islands and the Caicos were united into a commissionership under the governor of Jamaica. Area 169 sq. mi.; Pop. 4,774.

**Cain**, the eldest son of Adam and Eve; the first murderer, who slew his brother Abel. For the Biblical history of Cain and his descendants see Gen. 4-7.

**Cainozo'ic,** a geological term applied to the latest of the three divisions into which strata have been arranged, with reference to the age of the fossils they include. The *Cainozoic* system embraces the tertiary and post-tertiary systems, exhibiting recent forms of life, in contradistinction to the *Mesozoic*, exhibiting intermediate, and the *Paleozoic*, ancient and extinct forms. It corresponds nearly with what has been called the Age of Mammals.

**Caique** (ká-ök), a small skiff or rowing boat; especially a light skiff used in the Bosporus, where it almost monopolizes the boat traffic. It may have from one to ten or twelve rowers. The name is also given to a Levantine vessel of a larger size.

**Ca-ira** (sä-ē-rå), "It [the Revolution] shall go on," the burden or refrain of a French revolutionary song of 1790. The air was a favorite one with Marie Antoinette.

**Cairn** (kūrn), a heap of stones; especially one of those large heaps of stones common in Great Britain, particularly in Scotland and Wales, and generally of a conical form. They are of various sizes, and were probably constructed for different objects. Some are evidently sepulchral, containing urns, stone chests, bones, etc. Some were erected to commemorate some great event, others appear to have been intended for religious rites, while the modern cairn is generally set up as a landmark especially in Arctic regions for the guidance of subsequent explorers.

**Cairnes,** JOHN ELLIOT (1823-1875), economist, was b. in county Louth, Ireland. His father was a brewer, and as the son showed no aptitude for such learning as his teachers offered him, he was placed in the brewery. After a time, however, young Cairnes began to entertain a liking for intellectual pursuits, and, much against his father's will, went to Trinity College. Dublin, where he graduated in 1848. In 1856 he was appointed Whatley professor of political economy at Dublin, the first fruits of this office being his *Character and Logical Method of Political Economy* (1857). In 1859 he was elected to the chair of political economy and jurisprudence in Queen's College, Galway. He published in 1862 his book on the *Slare*  Power, which made a profound impression. In 1866 he was called to the chair of Political Economy in University College, London. He published his Essays on Political Economy, Theoretical and Applied in 1873, and in 1874 Some Leading Principles of Political Economy Newly Expounded.

Cairo (ki'ro) (Arab, Kahira, the Victorious), the capital of Modern Egypt. The city is partly surrounded by a fortified wall, and is intersected by 7 or 8 great streets, from which run a labyrinth of narrow, crooked streets and lanes. There are several large squares or places, the principal being the Ezbekiyeh. To the s.e. of the town is the citadel, on the last spur of the Mokattam Hills, overlooking the city. It contains the fine mosque of Mohammed Ali, a well 270 ft. deep called Joseph's Well, cut in the rock, the palace of the viceroy, etc. There are upward of 400 mosques. The finest is that of Sultan Hassan. There are also some 40 Christian churches, Jewish synagogues, etc. The tombs in the burying grounds outside the city also deserve mention, especially those known as the tombs of the Caliphs. The trade of Cairo is large, and the bazaars and markets are numerous. Of these the Khan el Kahalili, in the n.e. of the town, consists of a series of covered streets and courts, in which all kinds of Eastern merchandise are displayed in open stalls. Cairo has railway communication with Alexandria, Suez, and Siout. It was founded by the Fatimate Caliphs in A.D. 969, and its fortress was built by Saladin in 1176. It was taken from the Mamluke princes by the Turkish Sultan Selim in 1517. It was taken by the French in 1798, and in 1801 by the British, who restored it to the porte. After the battle of Tel-el-Kebîr in 1882, it again came into the possession of the British, and has become the center of English influence in Egypt. The terrible massacre of the Mamlukes took place in Cairo March 1, 1811. The tombs of the Mamluke rulers of Egypt, about 1 mi. from the city, are singularly beautiful, being built of white marble, richly carved and colored, and supporting gilded domes. Pop. 372,241.

**Cairo** (kā'ro), Alexander co., Ill., at Junction of Ohio and Mississippi rivers, 150 mi. s.e. of St. Louis. Rallroads: C. C. C. & St. L.: Mobile & Ohio; Illinois Central; St. L. I. M. & S.; and St. Louis Southwestern. Industries: mill and lumber, sewing machine works, milling, two iron foundries, and a dozen large wood-working factories. Surrounding country agricultural. The town was first settled in 1854 and became a city in 1857. Pop. est. 1897, 15,000.

**Cais** son. In civil engineering (a) a vessel in the form of a boat used as a floodgate in docks. (b) An apparatus on which vessels may be raised and floated; especially a kind of floating dock, which may be sunk and floated under a vessel's keel, used for docking vessels while at their moorings, without removing stores or masts. (c) A watertight box or casing used in founding and building structures in water too deep for the coffer dam, such as

piers of bridges, quays, etc. (d) The term is used also to describe an artillery ammunition wagon.

**Caithness**, a county of Scotland. The coast is rocky, and remarkable for bays and promontories, including among the latter, Dunnet Head, Duncansby Head, and Noss Head. Fishing, together with the rearing of sheep and cattle, forms the principal employment of the inhabitants. Flagstones (Caithness flags) for pavement are extensively quarried. The towns are Wick, the county town, and Thurso. Pop. 37, 137.

Pop. 37,137. **Caj eput Oil**, the volatile oil obtained from the leaves of the cajeput tree, a native of the Indian Archipelago and some parts of Australia, or from others of the same genus. It is used in medicine as a carminative, stimulant, sudorific, and antispasmodic: also externally in chronic rheumatism, and has been used as a cure for cholera.

**Calaba Oil**, an excellent illuminating oil obtwined from *calaba nuts*, the seeds of a tree that flourishes in Brazil and the West Indies.

**Calabar'**, a maritime district of West Africa on the Bight of Biafra, intersected by two rivers, called respectively Oll and New Calabar, under British protection: A large portion of the population is employed in the palm-oil trade. The district is now part of the Niger Coast Protectorate.

**Calabar Bean**, the seed of a leguminous African plant, nearly allied to the kidney bean. It is a powerful narcotic poison, operating also



Calabar Bean. a.-flowering branch; b.-seed pod; c.-seeds.

as a purgative and emetic, and in virtue of these last qualities is the famous "ordeal bean" of Africa, administered to persons suspected of witchcraft. If it causes purging it indicates crime: if vomiting, innocence. It induces fainting fits and asphyxia, and weakens or paralyzes the action of the heart. It is employed in medicine, chiefly (externally) as an agent for producing contraction of the pupil of the eye in certain cases; sometimes also



#### Calabash

(internally) in neuralgia, tetanus, and rheumatism.

**Cal'abash**, a vessel made of a dried gourd shell or of a calabash shell, used in some parts of America and Africa. They are so closegrained and hard that when they contain any liquid they may be put several times on the fire as kettles.

**Calabash Tree**, the popular name of certain American trees or shrubs given to them because of their large gourd-like fruits, the hard shells of which are made into numerous domestic utensils, as basins, cups, spoons, bottles, etc. The name is also given to the baobab of Africa.

**Cala bria**, a name applied to the s.w. peninsula in which Italy terminates. Area 5,810 sq. mi.: pop. 1,327,618. It is divided into three provinces—Cosenza, Reggio, and Catanzaro. The central region is occupied by the great Apennine ridge, to which whole colonies with their cattle migrate in the summer. Wheat, rice, saffron, anise, licorice, madder, flax, hemp, olives, almonds, and cotton are raised in abundance. The sugar cane also comes to perfection here. Sheep, horned cattle, and horses are numerous. Silkworms are extensively raised. The minerals include alabaster, marble, gypsum, alum, chalk, rock salt, lapis lazuli, etc. The fisheries are valuable.

**Calais** (kā-lā), a fortified seaport town of France, dep. Pas-de-Calais, on the strait of, and 25 mi. s. e. of Dover, and distant 184 mi. by rail from Paris. The Old Town or Calais proper-has a citadel, and was till recently surrounded by fortifications; but the modern suburb of St. Pierre les Calais having been amalgamated with Calais proper, both are now surrounded with forts and other works, to which morasses lend additional strength. Calais has considerable exports of grain, wine, and spirits, eggs, fruit, and vegetables; but the town derives its principal importance from its being the chief landing place for English trav-elers to the Continent. It has important manufactures of cotton and silk bobbinet lace. In 1347 Calais was taken by Edward III of England, after a siege of eleven months. In 1558 it was retaken by the duke of Guise, being the last relic of the French dominions of the Plantagenets, which at one time comprehended the half of France. Pop. 56,876.

**Calais**, a town of Maine, on the river St. Croix, a center of the lumber trade. Pop. 7,290.

**Calaman' der Wood**, a beautiful species of wood, the product of a tree, native of Ceylon. It resembles rosewood, but is so hard that it is worked with great difficulty. It takes a very high polish and is wrought into chairs and tables, and yields veneers of almost unequaled beauty.

**Cal amary**, the general name for the squid or cuttlefishes. The body is oblong, soft, fleshy, tapering, and flanked behind by two triangular fins, and contains a pen-shaped gladius or internal horny, flexible shell. They have the power of discharging, when alarmed or pursued, a black fluid from an ink bag.

## Calamy

The species are found in all seas, and furnish food to dolphins, whales, etc. Some species can dash out of the water and propel themselves through the air for 80 or 100 yards.



Cuttlefish.

**Calamianes** (-ä'nez), a cluster of islands in the Indian Sea, among the Philippines, forming a Spanish province.

**Cal'amint, a** plant, some species of which are known respectively by the names of mountain balm, catmint, basil balm, and wild basil. The first, also termed common calamint, has aromatic leaves, employed to make herb tea.

**Cal'amus**, a genus of palms, the stems of the different species of which are the rattan canes of commerce. The genus holds a middle station between the grasses and palms,



A, Acorus Calamus, showing rhizome; B. flower head: c.-separate floret; d.-floral dlagram, showing essentially lillaceous type; c.-verticul section of ovary; f.-single ovule.

with the habit of the former and the inflorescence of the latter. The species are principally found in the hotter parts of the East Indies.

**Cal'amy**, EDMUND (1600-1666), a Presbyterian divine. of England, He engaged warmly in the religious disputes of the day.

and was one of the writers of the famous treatise against Episcopacy, entitled Smeetymnuus, a title furnished from the initial letters of the authors' names. A relative of his, Edmund Calamy (1671-1732), has a place in literature as the biographer of Nonconformity. He published an abridgment of Baxter's History of His Life and Times, with a continuation; the Life of Increase Mather, etc.

**Calatra' va**, anciently a famous fortress of Spain, on the Guadiana, not far from Ciudad-Real. It gave its name to a Spanish order of chivalry founded by Sancho III in connection with the defense of the place against the Moors, 1158. For a long period the war with the Moors was carried on mainly by the knights of Calatrava, who acquired great riches. In 1808 their possessions were confiscated, and the order became a simple order of merit.

**Calca' reous,** a term applied to substances partaking of the nature of lime, or containing quantities of lime. Thus we speak of calcareous waters, calcareous rocks, calcareous soils.—*Calcareous apar*, crystallized carbonate of lime. It is found crystallized in more than 700 different forms, all having for their primitive form an obtose rhomboid.—*Calcareous tufa*, an alluvial deposit of carbonate of lime, formed generally by springs, which, issuing through limestone strata, hold in solution a portion of calcareous earth; this they deposit on coming in contact with air and light. Calc-sinter is a

**Calceolaria** (a slipper, from the shape of the inflated corolla resembling a shoe or slipper), slipperwort, a genus of ornamental herbaceous or shrubby plants. All the species are South American; extensively cultivated in gardens. Most of them have yellow flowers, some have puce-colored ones, and some occur with the two colors intermixed, while some are white. The greater number in cultivation are hybrids and not true species.

**Calcination,** the operation of roasting a substance or subjecting it to heat, generally with the purpose of driving off some volatile ingredient, and so rendering the substance suitable for further operations. The term was formerly also applied to the operation of converting a metal into an oxide or metallic calx; now called oxidation.

**Cal'cite**, a term applied to various minerals all of which are modifications of the rhombohedral form of carbonate of calcium. It includes limestone, all the white and most of the colored marbles, chalk, Iceland spar, etc.

**Cal'cium**, the metallic base of lime; in the metallic state, one of the rarest of substances; combined, one of the most abundant and most widely distributed. As phosphate, it forms the main part of the mineral matter of the boues of animals; as carbonate, chalk, limestone, or marble, it forms mountain ranges; as sulphate or gypsum, large deposits in various geological formations; it is a constituent of many minerals, as fluor spar, Iceland spar, etc., and is found in all soils, in the ash of plants, dissolved in sea water, and in springs, both common and mineral. It was first obtained in the metallic

state by Sir H. Davy in 1808. When quite pure, it is a pale-yellow metal, with a high luster. It is about one and a half times as heavy as water, ductile, malleable, and very oxidizable. Its salts are for the most part insoluble or sparingly soluble in water, but dissolve in dilute acids.

**Calc-sinter**, a carbonate of lime, the substance which forms the stalactites and stalagmites that beautify many caves.

**Calculating Machines**, machines or contrivances by which the results of arithmetical operations may be obtained mechanically. Various machines of this kind have been produced. The more complicated ones invented for more difficult operations by Babbage were never completed. Machines called comptometers and adders are in general use in America, and perform arithmetical operations with exactitude. The well-known "cash register" is a similar machine.

Cal'culus, the Infinitesimal, or Transcendental Analysis, a branch of mathematical science. The lower or common analysis contains the rules necessary to calculate quantities of any definite magnitude whatever. But quantities are sometimes considered as varying in magnitude, or as having arrived at a given state of magnitude by successive variations. This gives rise to the higher analysis, which is of the greatest use in the physico-mathemat-ical sciences. Two objects are here proposed: First, to descend from quantities to their ele-ments. The method of effecting this is called the differential calculus. Second, to ascend from the elements of quantities to the quantities themselves. This method is called the integral calculus. Both of these methods are included under the general name infinitesimal or transcendental analysis. Those quantities which retain the same value are called constant; those whose values are varying are called rariable. When variable quantities are so connected that the value of one of them is determined by the value ascribed to the others, that variable quantity is said to be a function of the others. A quantity is infinitely great or infinitely small, with regard to another, when it is not possible to assign any quantity sufficiently large or sufficiently small to express the ratio of the two. When we consider a variable quantity as increasing by infinitely small degrees, if we wish to know the value of those increments, the most natural mode is to determine the value of this quantity for any given period, as a second of time, and the value of the same for the period immediately following. This difference is called the differential of the quantity. The integral calculus, as has been already stated, is the reverse of the differential calculus. There is no variable quantity expressed algebraically, of which we cannot find the differential; but there are differential quantities which we cannot integrate: some because they could not have resulted from differentiation; others because means have not yet been discovered of integrating them. Newton was the first discoverer of the principles of the infinitesimal calculus, having pointed them out in a treatise

#### Calculus

written before 1669, but not published till manyyears after. Leibnitz, meanwhile, made the same discovery, and published it before Newton, with a much better notation, which is now universally adopted.

**Calculus,** in pathology, a general term for the various inorganic concretions which are sometimes formed in the body. Such are *biliary calculi* or gall-stones, formed in the gall bladder; *urinary calculi*, formed by a morbid



Alternating Calculus. a.-uric acid nucleus; b.-oxalate of lime; c.-phosphates of lime, and of magnesia and ammonia.

deposition from the urine in the kidney or bladder; and various others known as salizary, arthritic, pancreatic, lachrymal, etc. Urinary and biliary calculi are the most common. The former, when the particles are comparatively small in size, are known as grazel, when larger as stone. Either cause painful and dangerous symptoms. Stone in the bladder is often operated on by means of lithotomy or lithotrity.

Calcutta, capital of British India and of Bengal; situated on the Hooghly (Húgli), a branch of the Ganges. The river opposite the to three quarters of a mile. The city extends along the bank for about 41 mi., and with a breadth of about 11 mi., the entire site of Calcutta proper being about 8 sq. mi. Adjacent to the city itself, however, are extensive suburbs, which include the large town of Howrah, on the opposite side of the Hooghly, connected with Calcutta by a pontoon bridge. The houses of the south or British quarter of Calcutta are of brick, elegantly built, and many of them like palaces, in striking contrast with the northern quarter, occupied by the natives, which has narrow, crooked, and ill-built streets. The city is encompassed by a spacious way called the Circular Road. On the west side is an extensive quay about 2 mi. long, called the Strand. Outside the city, between the river and the fashionable quarter, lies Fort William, a magnificent octagonal work, which cost altogether \$10,000,000, mounts over 600 guns, contains 80,000 stand of arms, and will hold 15,000 men. The plain between Fort William and the city forms a favorite prome-At the north side, called the Esplanade. nade, stands the government house, or palace of the governor general, built by the Marquis

#### Caldecott

Wellesley, at an expense of \$5,000,000. Other edifices worthy of notice are the townhall, supreme court, government treasury, writers' buildings, Metcalfe Hall, mint, theater, medical college, general post office, general hospital, the new cathedral, the old cathedral. tolerably good supply of filtered water from the Hooghly is furnished to the inhabitants, and a complete system of drainage has been constructed. Calcutta has an extensive system of internal navigation through the numerous arms and tributaries of the Ganges, and it almost monopolizes the external commerce of Bengal. There is a railway from Calcutta to Delhi, with branches to Ranigunge, Agra, etc., and through Allahabad to Bombay. Another line extends to Dacca. There is telegraphic communication with all parts of India. and with Europe. The principal exports are opium, cotton, rice, wheat, jute, gunny bags, tea, indigo, seeds, raw silk, etc. Of the imports the most important in respect of value are cotton goods. Salt is a considerable import. The maritime trade is of the annual value of fully \$350,000,000; the inland trade is as large or larger. In 1686 a factory of the East India Company was established here, and in 1700 three adjoining villages were presented to the company by the emperor of Delhi. The settlement was then fortified, and called Fort William, in honor of the then king of England, but subsequently it received its present name, which had been that of one of the villages. C. was made the capital of a presidency in 1707, but it first figures in history in connection with the events of 1756. In that year it was attacked suddenly by Surajah Dowlah, and after a stout siege was shamefully deserted by the officers on duty. In two days more disturb-ances within the town itself led to its surrender. Then followed the fearful tragedy of the Black Hole, when 146 English captives were forced into a room only 20 ft. square, to pass one of the hottest nights of an Indian summer. On the following morning it was found that there barely survived twenty-three of the number. Eight months later Clive and Admiral Watson rescued C., which soon afterward entered on its modern career of prosperity. At the end of the seventeenth century Calcutta was only a cluster of three mud villages. It now contains, with its suburbs, a population of 850,000.

**Calda'ra**, POLIDORO (1495-1543) (called also *Caracaggio*), an Italian painter. In his youth he carried bricks for the masons in the Vatican, and envying the artists at work there devoted himself to painting under the guidance of Maturino. He was afterward employed by Raphael on the friezes of the Vatican. The oil painting of *Christ on the way to Calvary* is his most noteworthy picture.

**Calde' cott**, RANDOLPH (1846-1886), a noted artist. He entered a bank, but gave up banking for art. His first success was the publication, in 1875, of his illustrations of a volume of selections from Washington Irving's Sketchbook, under the title of Old Christmas. It was followed by his illustrations of Bracebridge

Hall, of Mrs. Carr's North Italian Folk, Blackburn's Breton Folk, of Æsop's Fables with Modern Instances. His most popular work, however, was the series of colored, children's books commenced by him in 1878, and including John Gilpin, the Elegy on the Death of a Mad Dog, and the Great Panjandrum. He died at St. Augustine, Florida.

**Calderon' de la Bacra**, DON PEDRO (1600-1681), the great Spanish dramatist, educated in the Jesuits' College, Madrid, and at Salamanca. Before his fourteenth year he had written his third play. Calderon has left 95 autos sacramentales, 200 loas (preludes), and 100 saynetes (farces). He wrote his last play in the eightieth year of his age.

**Caledonia** (Caledonians), the names by which the northern portion of Scotland and its inhabitants first became known to the Romans, when in the year 80 Agricola occupied the country up to the line of the Firths of Clyde and Forth. He defeated the Caledonians in 83, and again at Mons Grampius in 84, a battle of which a detailed description is given by Tacitus. In the early part of the third century they maintained a brave resistance to Severus, but the name then lost its historic importance. Caledonia is now used as a poetical name of Scotland.

**Caledonian Canal**, a water way passing through Glenmore or the Great Glen of Scotland, and allowing vessels of 500 or 600 tons to sail from the Moray Firth to Loch Eil and the sea on the west. The route passes through Lochs Ness, Oich, and Lochy, the whole distance from sea to sea being about 60 mi., of which only 22 consist of canal proper. The scenery is of the finest in Scotland, this route being extremely popular with tourists.

Cal'endar (L. calendarium, from calenda, the first day of the month), a record or marking out of time as systematically divided into years, months, weeks, and days. The periodical occurrence of certain natural phenomena gave rise to the first division of time, the division into weeks being the only purely arbi-trary partition. The year of the ancient Egyptians was based on the changes of the seasons alone, without reference to the lunar month, and contained 365 days divided into twelve months of thirty days each with five supplementary days at the end of the year. The Jewish year consisted of lunar months of which they reckoned twelve in the year, intercalating a thirteenth when necessary to maintain the correspondence of the particular months with the regular recurrence of the seasons. The Greeks in the carliest period also reckoned by lunar and intercalary months, but after one or two changes adopted the plan of Meton and Euctemon, who took account of the fact that in a period of nineteen years, the new moons return upon the same days of the year as before. This period of nine-teen years was found, however, to be about six hours too long, and subsequent calculators still failed to make the beginning of the seasons return on the same fixed day of the year. Each month was divided into three decades.

The Romans at first divided the year into ten months, but they early adopted the Greek method of lunar and intercalary months, making the lunar year consist of 354, and afterward of 355 days, leaving ten or eleven days and a fraction to be supplied by the inter-calary division. This arrangement continued till the time of Cæsar. The first day of the month was called the *calends*. In March, May, July, and October the 15th, in other months the 13th, was called the *ides*. The ninth day before the ides (reckoning inclusive) was called the nones, being therefore either the 7th or the 5th of the month. From the inaccuracy of the Roman method of reckoning the calendar came to represent the vernal equinox nearly two months after the event, and at the request of Julius Cæsar, the Greek astronomer Sosigenes, with the assistance of Marcus Fabius, contrived the so-called Julian calendar. The chief improvement consisted in restoring the equinox to its proper place by inserting two months between November and December, so that the year 707 (B. c. 46), called the year of confusion, contained fourteen months. In the number of days the Greek computation was adopted, which made it 3651. To dispose of the quarter of a day it was determined to intercalate a day every fourth year between the 23d and 24th of February. This calendar continued in use among the Romans until the fall of the empire, and throughout Christendom till 1582.

By this time, owing to the cumulative error of eleven minutes, the vernal equinox really took place ten days earlier than its date in the calendar, and accordingly Pope Gregory XIII issued a brief abolishing the Julian calendar in all Catholic countries, and introducing in its stead the one now in use, the Gregorian or reformed calendar. In this way began the new style, as opposed to the other or old style. Ten days were to be dropped; every hundredth year, which by the old style was to have been a leap year, was now to be a common year, the fourth excepted; and the length of the solar year was taken to be 365 days, five hours, forty-nine minutes, and twelve seconds, the difference between which and subsequent observations is immaterial. The new calendar was adopted in Spain, Portugal, and France in 1582; in Catholic Switzerland, Germany, and the Netherlands in 1583; in Poland in 1586; in Hungary in 1587; in Protestant Germany, Holland, and Denmark in 1700; in Switzerland in 1701; in England in 1752; and in Sweden 1753. In the English calendar of 1752, also, January 1 was now adopted as the beginning of the legal year, and it was customary for some time to give two dates for the period intervening between January 1 and March 25, that of the old and that of the new year, as January 175%. Russia alone retains the old style, which now differs twelve days from the new.

In France, during the Revolution, a new calendar was introduced by a decree of the National Convention, Nov. 24, 1793. The time from which the new reckoning was to commence was the autumnal equinox of 1792,

' which fell upon the 22d of September, when the first decree of the new republic had been promulgated. The year was made to consist of twelve months of three decades each, and, to complete the full number, five fete days, or sansculatides (in leap years six) were added to the end of the year. The seasons and months were as follows: Autumn, September 22 to December 22,— Vendémiaire, vintage month; Brumaire, foggy month; Frimaire, sleet month. Winter, December 22 to March 22,- Nivõse, snowy month; Pluvidse, rainy month; Ventdse, windy month. Spring, March 22 to June 22,-Germinal, bud month; Floréal, flower month; Prairial, meadow month. Summer, June 22 to September 22,- Messidor, harvest month; Thermidor, hot month; Fructidor, fruit month. The common Christian or Gregorian calendar was re-established in France on January 1, 1806, by Napoleon. For the Mohammedan calendar, see Hegira.

**Cal'ender**, a machine consisting of two or more cylinders (calenders) revolving so nearly in contact with each other that cloth or paper passed between them is smoothed and glazed by their pressure, or some other kind of finish is imparted to the surface. **Cal'ends.** See Calendar. The Greek calends,

**Cal'ends.** See Calendar. The Greek calends, a time that never occurred; an ancient Roman phrase which originated in the fact that the Greeks had nothing corresponding to the Roman calends.

**Cal'gary**, a rising town on the Canadian Pacific Railway, near the eastern base of the Rocky Mountains, in the district of Alberta, the center of an important cattle and horseranching district. Pop. 1,600.

**Calhoun** (kal-hön'), JOHN CALDWELL, an American statesman (1782–1850). He was admitted to the bar of South Carolina in 1807, and in 1811 was sent to Congress, where he distinguished himself by his eloquent advocacy of the war with England. In 1817 he was made secretary of war under President Monroe; in 1824 he was elected vice-president of the U. S.; in 1832, a senator; in 1844, secretary of state, and in 1845, again a senator. He continued till his death an advocate of extreme state rights, and of the policy of slave-holding states. In 1829 he carried the famous South Carolina "nullification resolution," and was the father of the doctrines which caused the South to secede in 1861.

**Cali** (kä'lē), a town of South America, Colombia, state of Cauca, with a good trade. Pop. 12,743.

**Cal** ico (from *Calicut* in India), a general term for any plain white cotton cloth; in America usually applied to printed cottons.

**Calico Printing** is the art of applying colors to cloth after it has come from the hand of the weaver in such a manner as to form patterns and figures. This art, originally brought from India, is sometimes practised on linen, woolen, and silk, but most frequently upon that species of cotton cloth called calico. The process was first introduced into Britain in 1738, and was originally accomplished by means of handblocks made of wood, on which patterns or parts of patterns for each different color were These blocks were of various dimensions, cut. according to the nature of the work, and where several colors were employed in one pattern, a block for each color was necessary. As an improvement in the method of printing from wooden blocks especially where delicacy of outline is required, engraved copper plates were introduced about 1760; but the greatest improvement was effected by the introduction of cylinder printing about 1785, which has almost superseded the other methods, except for particular styles. The machinery now generally used consists of various modifications of the cylinder printing machine, in which a number of separate engraved cylinders are mounted, corresponding to the number of colors to be printed. Formerly the cloth had to pass once through the machine for every color; but now, by an arrangement of machinery equally ingenious and effective, any number of cylinders are fitted on one machine, which act on the cloth one after the other, and by this means the pattern is finished with a corresponding number of colors in the same time that was formerly employed to give one. A great variety of methods are employed in calico print-ing, but they all fall under the general heads of dye colors, and steam colors. Under the first. head are included all the styles in which the pattern is printed on the cloth by a mordanta substance which may have little or no color itself, but has an affinity for the fiber on the one hand, and for the coloring matter on the other-the dye or coloring matter being subsequently fixed by dyeing on such parts of the cloth as have been impregnated with the mordant, and thus bringing out the pattern. In steam color printing, the coloring material is applied to the cloth direct from the printing cylinder, and subsequently fixed by steaming. In steam colors there is no limit to the number and variety of shades which may be produced, each color box on the cylinder printing machine containing the whole ingredients essential to the production and fixation of a separate and distinct shade of color. This process is superseding most of the other styles, the brilliant coal tar colors so extensively used being almost entirely fixed by steaming. The bodies used for fixing are tin mordants, tannic acid, etc., which are mixed with the dye colors and printed together. The effects of calico printing are varied by numerous other operations, such as the discharge style, in which the cloth is first dyed all over, then printed in a certain pattern with discharge chemicals, which either produce a pattern of some other color, or one purely white, as in the Turkey-red ban-danna handkerchiefs. The resist style, in some respects, is the reverse of the discharge style; the process being to print a pattern in certain chemicals, which will enable those parts to resist the action of the dye subsequently applied to all other parts of the cloth After the prints have undergone the printing process they are submitted to a series of finishing operations, the object of which is to give to the fabrics a pleasing appearance to the eye.



**Cal'icut**, a seaport of India, presidency of Madras, on the Malabar coast, which was ceded to the British in 1702. It was the first port in India visited by Europeans, the Portuguese adventurer, Pedro da Covilham having landed here about 1486, and Vasco da Gama in 1408. It has considerable trade, and manufactures cotton cloth, to which it has given the name *calico*. Pop. 66,078.

California has a coast line of 900 mi. on the Pacific Ocean, extends from the latitude of Boston to that of Charleston. On the n. is Oregon, on the e. are Nevada and Arizona Ter-ritory, and on the s. is Lower California. The lower two thirds of the state has a southeasterly trend, the easterly boundary being as nearly as possible parallel with the coast line. The extreme length is 775 mi., the maximum width 235 mi., and the minimum width 148 mi. The total area is 158,360 sq. mi., and the land area 155.980 sq. mi., making the state second only to Texas in size. The central portion is embraced between the parallels 35° and 40°, and has on its e. side the Sierra Nevada, and on its w. the Coast Ranges. Between these two mountain chains lies the Great Central Valley of the Sacramento and San Joaquin, renowned for its beauty and fertility. It is this valley, which is about 450 mi. in length by about 40 in breadth, to which the state now owes its principal wealth, and which has made it famous for its wheat, its wool, its fruits (including subtropical fruits in the s.), and the produce of its vineyards. N. of the parallel of 40°, where the Coast Ranges and the Sierra unite, the country is extremely rough and thinly inhabited. That portion of the state which lies to the s. and e. of the southern junction of the Coast Ranges and the Sierra is also thinly inhabited, with the exception of a narrow strip along the coast. The principal river is the Sacramento, which flows s. for upward of 300 mi., receiving numerous affluents from the Sierra Nevada, and falls into the bay of Suisun. The San Joaquin rises in the Sierra Nevada, flows n. for about 250 mi., and joins the Sacramento about 15 mi. above Suisun Bay. It receives the waters of lake Tulé or Tulares, and has numerous tributaries. The Bay of San Francisco, forming the most capacious harbor on the Pacific coast, is about 60 mi. in length, 14 broad, and with a coast line of 275 mi. It is connected with the ocean by a strait two mi. wide, and from five to seven long, called the Golden Gate.

The peaks of the Sierra Nevada — Mount Shasta, Lassen's Butte, Spanish Peak, Pyramid Peak, Mounts Dana, Lyell, Brewer, Tyndall, Whitney, and others — reach from 10,000 to nearly 15,000 ft. above the sea (Mount Whitney is 14,886). The volcanic character of the state is manifested by the mountain formations; and earthquakes are frequent. California is celebrated for its many wonderful natural objects and remarkable scenery. Noteworthy are the Yosemite Valley and the "big tree groves," containing groups of giant redwood trees — Sequoia gigantea — some of which reach the height of nearly 400 ft.

In the Colorado desert are depressions several hundred feet below the level of the sea. Saline marshes and alkaline tracts are features of the desert. Hot and cold mineral springs abound in the state, and cover a wide range of medicinal virtues: these are confined to no particular district, but are most numerous in the counties of Lake, Napa, and Sonoma. The Geysers, in Sonoma county, yield great volumes of steam and boiling mineral waters of various kinds, and as a natural wonder are second only to the Geysers of the Yellowstone. Several lakes of great beauty exist in the Sierra, the largest being Lake Tahoe, twenty miles long and 6,200 ft. above the level of the sea. (It has been proposed to tap this enormous reservoir to secure water for irrigation and for domestic consumption.) Another large and beautiful lake, called Clear Lake, lies in the coast range n. of San Francisco.

Climate.-Within the borders of California may be found great varieties of climate. Below and near the line of the Sierras the peculiarities of climate are small rainfall, rainless summers, and almost constant winds off the Pacific, and the absence of extremes of temperature. The wind of summer comes generally from the north and northwest. This wind has a steady effect west on the coast ranges, and is deflected in the valleys of the Sacramento and the San Joaquin southward and its temperature is much raised, so that in the interior valleys the summer is warm. In the Sacramento valley the average sum-mer temperature is 80° and in the San Joaquin valley 83.8°. At San Francisco it is 58°; at Los Angeles, 73.2°; at San Diego on the ex-treme southern coast, 60.7°. There are no rains in the summer but the winds carry much moisture and the late nocturnal temperature of summer contains this moisture in the form of heavy dews. The prevailing winds of winter come from the south and southwest and these make the winter warm. On the coast the difference between summer and winter temperature is very small. For instance at San Francisco, the difference is less than eight degrees. Winter winds bring the rains which fall from November to April. The rainfall in the northern part of the state is much greater than that of the southern.

Vegetation.-In the coast range valleys there is almost always a sufficient rainfall to ripen the crops, but in the interior basin and in the south it is uncertain and generally inadequate. Irrigation is used to a large extent to water the land and the arid lands have been made serv-The fruit-growing industries have iceable. developed so rapidly that other industries have passed into the background. As soon as the gold fever subsided the agricultural possibili-ties of the state came into view. At first the agricultural pursuits were confined to live stock which found pasture in the plains in winter and in the mountains in summer. On the coast the early settlers planted grapes and grew small cereals; then the cultivation of grain was begun and flouring mills established. Wheat is the principal grain and the acreage

has constantly increased in the last twenty years. The great bulk of the grain is raised in the Sacramento and San Joaquin valleys. The vine and fruit yield is large, and, owing to the freedom from rain, the fruit can be dried in the open air. Trees and vines come into bearing at an early age. Certain wines can be produced which are unique to Cal-The principal fruits and nuts are ifornia. grapes, oranges, lemons, olives, figs, prunes, peaches, pears, apricots, nectarines, cherries, apples, plums, and English walnuts, and such small fruit as blackberries, strawberries, raspberries, currants, and gooseberries. The growing of vegetables is a large industry; vegetables raised are beans, potatoes, onions, and hops. Wide varieties of soil and climatic conditions give rise to a diversified range of vegetation. In the valleys may be found occasional groves of white oak and live oak, and on the plains in the early spring are many wild flowers. The coast ranges are generally covered with various members of the pine family. The sugar pine in the north is usually of great size, and with the redwood is of great commercial importance. There are various species of cedars and cypresses. The most striking species of trees are Sequoia Gigantea (the big tree of California), and the Sequoia Semperoireus (redwood); some of the larger ones have a height of 350 ft. and a diameter of 20 to 40 ft. California laurel is a useful tree largely employed in the interior finish of houses. There are many varieties of lilies, including the tiger lily. Other varieties of flowers are wild rose, yellow pansy, sage, larkspur, bluebell, tulip, dandelion, etc. Mustard is very common on the plains and often grows to a height of 7 ft.

Railroads and other transportation facilities. The railroads entering the southern part of the state are Southern Pacific and A. T. & S. F.; in the central part is the Central Pacific Railway. The Southern Pacific Company controls and operates 6,000 miles of railroad. three main arms of which are: 1, from San Francisco to New Orleans; 2, from San Francisco to Ogden, where connection is made with the Union Pacific; 3, from San Francisco to Portland, Ore. It also controls numerous branches, especially in California, running from main lines to fer-tile sections. There are also many roads within the state. Other transportation facilities consist of a large fleet of sailing vessels and several lines of steamers which sail at regular intervals. The Occidental Steamship Co., sending steamers to Japan and China; the Oceanic Steamship Co., to the Hawaiian Islands, New Zealand, and Australia; and the Pacific Mail Steamship Co. The coast lines include the Pacific Coast Steamship Co., sending vessels to Alaska and intermediate points of the north, and to Mexico; the U. P. Ry. division, and the Oregon Development Co.

Minerals.—Since 1848 when gold was first discovered in California, mining has been the most important industry in the state. Both gold and silver have been mined in great quantities. Until 1878 gold mining was carried on in a reckless manner and prospectors wan-

dered from one end of the state to the other: but in the year mentioned matters took a more rational turn and mining was put upon sound business principles. Silver has been mined with varied success, and much capital has been spent in trying to develop the silver lodes which have from time to time been discovered. The best paying silver mines are those in the Inyo range. Quicksilver has been extensively mined in California, and also copper ores ap-pear in many localities. Zinc and lead occur in a great number of the quartz veins of the gold-bearing valleys. Iron ores are also found in some localities. The only coal mines of any consequence in California are found in Monte Diablo, a few miles from the entrance of San Joaquin River into Suisun Bay. Borax and sulphur have been mined in several localities. Marble is quarried in places on the Sierra Nevada for architectural purposes. There is also some granite.

Manufactures.—The forests afford a great amount of lumber and the manufacture and shipment of lumber constitutes an important industrial feature. Other manufactures are the distillation of brandy, sugar refining, drying and preserving of fruits, shipbuilding and the packing of meats.

Education. — California has an extensive and thorough system of public instruction which extends into the remotest districts. The system consists of a state board of education, superintendent of public instruction, county board of education, county superintendent, city board, and district trustees. There is a state university at Berkeley, state normal schools at San Jose, Los Angeles and Chico. Besides the public schools there are many private institutions of a high order. The Leland Stanford, Jr., University has an annual income of \$250,000, about 1,100 students, 85 instructors and 30,000 books. The estate on which the university is situated covers 7,500 acres. The Lick Observatory, which is an adjunct of the state university, is constructed and equipped on Mt. Hamilton.

History.-Spaniards came to California as early as 1534 and it is believed that Cortez surveyed the Gulf of California in 1536. Sir Francis Drake visited the coast in 1578. The early missions were under Franciscan control. California became independent of Spain in 1822, and until after the war of 1847 the region was chiefly important for its export of hides and skins. California was part of the territory ceded to the U.S. by Mexico after the Mexican War. Gold was discovered in 1848 and there was an enormous rush of gold seekers. California was admitted to the Union in 1850. At first it was peopled by lawless spirits and crimes of violence were frequent and apt to go unpunished. Recourse was had to the inevi-table "lynch" law and in 1851 the citizens of the chief towns established a vigilance committee. Gradually a better regulated order of things was established and the development of the country has since been steady and rapid. The principal cities are San Francisco, Los Angeles, San Diego, Oakland, Alameda, Berkeley. Bakersfield, Fresno City, Napa City, Nevada City, Sacramento, capital of the state, Stockton, Santa Cruz, San Jose, Palo Alto, Monterey, Santa Rosa, and Marysville. Pop. in 1890 was 1,380,500.

Governors.—1840, Peter H. Burnett; 1851, John McDougal; 1852, John Bigler; 1856, J. Neely Johnson; 1858, John B. Weller; 1860, Milton S. Latham; 1860, John G. Downey; 1862, Leland Stanford; 1863, Frederick F. Low; 1867, Henry H. Haight; 1871, Newton Booth; 1875, Romualdo Pacheco: 1875, William Irwin; 1880, George C. Perkins; 1883, George Stoneman; 1887, Washington Bartlett; 1887, R. W. Waterman; 1891, H. H. Markham; 1895, J. H. Budd. **California**, GULF of, a gulf on the w. coast of North America, in Mexico Lying between

**California**, GULF OF, a gulf on the w. coast of North America, in Mexico, lying between the peninsula of Lower California and the mainland. It is about 700 mi. long, and through most of its length, is less than 100 mi. wide. It has long had a pearl fishery.

**California**, LowER, a territory of Mexico, comprising a peninsula jutting into the Pacific Ocean, and separated from the mainland throughout its entire length by the Gulf of California. Area 58,328 sq. mi. It is largely mountainous and arid, but is said to possess valuable agricultural and mineral resources. The chief towns are Loretto, and La Paz, the capital. Pop. 35,720, of whom perhaps half are Indians.

Calig'ula, CAIUS CÆSAR AUGUSTUS GERMANI-CUS (A. D. 12-41), Roman emperor, son of Ger-manicus and Agrippina. He received from the soldiers the surname of Caligula, on account of his wearing the caligæ, a kind of boots in use among them. He succeeded Tiberius, A. D. 37, and made himself very popular by his mildness and ostentatious generosity; but at the end of eight months he was seized with a disorder caused by his irregular mode of living, which appears to have permanently deranged his intellect. After his recovery, he suddenly showed himself the most cruel and unnatural of tyrants - a monster of debauchery and prodigality, a perpetrator of the great-est crimes and follies. The most exquisite tortures inflicted on the innocent served him for enjoyments. In the madness of his arrogance he even considered himself a god, and caused sacrifices to be offered to himself. One of his greatest follies was the building of a bridge between Baiæ and Puteoli (Puzzuoli), in order that he might be able to boast of marching over the sea on dry land. He projected expeditions to Gaul, Germany, and Britain, and on reaching the sea, bade his soldiers gather shells for spoils, and led them back to Rome. At last a band of conspirators put Rome. At last a band of conspirators put an end to his career in the 29th year of his age.

**Cal'iper Compasses**, compasses made either with arched legs to measure the diameters of cylinders or globular bodies, or with straight legs and retracted points to measure the interior diameter or bore of anything.

**Cal' iph** (Calif, or Khalif—vicegerent), is the name assumed by the successors of Mohammed in the government of the faithful and in the high-priesthood. Caliphate is therefore the name given to the empire of these princes which the Arabs founded in Asia, and enlarged, within a few centuries, to a dominion exceeding even the Roman Empire in extent. The appellation of caliph has long ago been swallowed up in *shah*, *sultan*, *emir*, and other titles peculiar to the East.

**Calisa' ya Bark**, a variety of Peruvian or cinchona bark.

**Calisthen' ics** (Gr. kalli-, beautiful, and sthenos, strength), the art or practise of exercising the body for the purpose of giving strength to the muscles and grace to the carriage. The term is usually applied to the physical exercises of females, as gymnastics is to those of males.

Calix'tus, the name of three popes. CALIX-TUS I was a Roman bishop from 217 to 224, when he suffered martyrdom. CALIXTUS II was elected in 1119, in the monastery of Clugny, successor of the expelled pope, Gelasius II, who had been driven from Italy by the Emperor Henry V, and had died in this monastery. He excommunicated the Emperor Henry V on account of a dispute respecting the right of investiture; as also the anti-pope Gregory VIII, whom he drove from Rome. He availed himself of the troubles of the emperor to force him, in 1122, to agree to the Concordat of Worms. He d. in 1124. CALIXTUS III, chosen in 1168 in Rome, as anti-pope to Paschal III, and confirmed by the Emperor Frederick I, in 1178, was obliged to submit to Pope Alexander III. As he was not counted among the legal popes, a subsequent pope, Alfonso Borgia, made pope in 1455, was called Calixtus III. He d. in 1458.

**Calixtus,** GEORG (1586-1656), an able and enlightened German theologian of the Lutheran Church in the seventeenth century. He wrote against the celibacy of the clergy, and proposed a reunion of Catholics and Protestants upon the basis of the Apostles' creed.

**Calla**, a genus of plants, nat. order Orontiaceæ. The known species are few and of widely different habitats, occurring in the north of America and Europe. It has a creeping root stock extremely acrid in taste, but which, when deprived

of its causticity by maceration and boiling, is made by the Lapps into bread. The beautiful Ethiopian lily was for merly included in this genus and is still sometimes called *Calla* 

Callao (kålyä'ö), a seaport town of Peru, the port of Lima, from which it is 6 mi.



#### Callimachus

distant, and with which it is connected by a railway; pop. 36,805. The roadstead is one of the best in the Pacific, and there is a dock, with an area of nearly 52 acres, constructed at a cost of \$8,500,000, besides a floating iron dock. Callao is the emporium of the whole of the trade of Peru, importing manufactured goods, and exporting guano, copper ore, cubic niter, wool, bark, etc. In 1746 the old town was destroyed by an earthquake, with much

Callim'achus. 1, A Greek poet and gram-marian, b. at Cyrene, in Libya, of a noble family: flourished about 250 B. C. He taught at Alexandria, and was appointed by Ptolemy Philadelphus librarian of the Alexandrine Museum. He wrote an epic poem called Galatea, several prose works, and tragedies, elegies, comedies, etc., but only some seventy-two epigrams and six hymns remain. 2, A Greek architect and artist, flourished about 400 B. c., the reputed originator of the Corinthian column.

Calli'nus, of Ephesus, the earliest Greek elegiac poet, flourished about 730 B. C. Only a few fragments of his elegies are extant.

Calliope (kal-i'o-pe) one of the Muses. She presided over eloquence and heroic poetry, and is said to have been the mother of Orpheus by Apollo.

**Callis'thenes** (-ēz) (B. c. 360-328) a Greek philosopher and historian, a native of Olynthus, was appointed to attend Alexander in his expedition against Persia. He was put to death on a pretended charge of treason. He wrote a history of the Actions of Alexander and other historical works.

Calms, REGIONS OF, tracts in the Atlantic and Pacific oceans, on the confines of the trade winds, where calms of long duration prevail.

Cal'omel, mercurous chloride; a preparation of mercury much used in medicine, and also found native as horn quicksilver. It is prepared by grinding in a mortar sulphate of mercury with as much mercury as it already contains, and heating the compound which is formed with common salt in a retort until the mercury sublimes. The calomel is thus produced as a white powder. It is used in a variety of ailments, as a purgative, a vermifuge, etc.

Calorim'eter, an apparatus for measuring absolute quantities of heat or the specific or latent heat of bodies, as an instrument for measuring the heat given out by a body in cooling from the quantity of ice it melts or from the rise of temperature it produces in water around it.

Cal otype, the name given to the process, invented by Talbot about 1840, of producing photographs by the action of light upon paper impregnated with nitrate of silver.

Calpur' nia, the fourth wife of Julius Cæsar, married to him 59 B. C. She was a daughter of L. Calpernius Piso, who was consul in 58 B. C.

Caltagirone (-jē-ro'nā), a town of Sicily, 34 mi. s. w. of Catania; the see of a bishop. It is noted for the manufacture of terra cotta figures and pottery. Pop. 28,119.

Caltanisset'ta, a town, Sicily, capital of the province of same name, on the right bank of the Salso, 62 mi. s. e. of Palermo. In the vicinity are springs of petroleum and of hydrogen gas, a mud volcano, and important sui-phur mines. Pop. 31,762. The province has an area of 1,445 sq. mi., with a population of 265, 930.

Caltha, the genus of plants to which the marsh marigold belongs.

Cal' trop, a military instrument with four iron points disposed in such a manner that three of them being on the ground the other

points upward; formerly scattered

on the ground to impede the progress of an enemy's cavalry. Also the common name of the star thistle, found in waste places in the south of England. The heads Caltrop. are covered with long yellow spines.

Calum'ba (or Colombo), a plant, indigenous to the forests of Mozambique. The large roots are much used as a bitter tonic in cases of indigestion. American or false calumba is the bitter root of a gentianaceous herb found in North America.

Cal'umet, a kind of pipe used by the American Indians for smoking tobacco. Its bowl is usually of soft red soapstone, and the tube a long reed, ornamented with feathers. The Calumet was used as a symbol or instrument of peace and war. To accept the calumet is to agree to the terms of peace, and to refuse it is to reject them. The calumet of peace is used to seal or ratify contracts and alliances, to receive strangers kindly, and to travel with safety. The calumet of war, differently made. is used to proclaim war.

Calvados (kål-vå-dos), a French dep., part of the old province of Normandy. Area 2,145 sq. mi. It is named from a dangerous ridge of rocks which extends along the coast for 10 or 12 mi. The dep. is undulating and picturesque. and possesses rich pastures. Pop. 428,945. Chief town, Caen.

**Cal vary**, applied to the place outside Jeru-salem where Christ was crucified, usually identified with a small eminence on the north side of the city. The term is also applied in Catholic countries to a kind of chapel, sometimes erected on a hill near a city and sometimes on the exterior of a church, as a place of devotion, in memory of the place where our Saviour suffered; as also to a rocky mound or hill on which three crosses are erected, an adjunct to religious houses.

Calvé, EMMA, celebrated operatic vocalist, b. in France in 1866. She made her début in Faust, in 1882, at Brussels. A few years later she made a tour of Italy. She scored a grand success at Covent Garden in 1893 where she appeared at the command of the queen. She made American tours in 1894, 1896, and 1897.

Cal'vert, GEORGE, the first Baron Baltimore. See Lord Baltimore.

Calvin, JOHN (1509-1564), reformer and Protestant theological writer, b. at Noyon. in Picardy. He went to Paris and entered

regular study. He soon became dissatisfied with the teaching of the Roman Catholic Church; in consequence he gave up his curé, and took to the study of the law in Orleans. In 1532 he returned to Paris a decided convert to the reformed faith, and was soon compelled to fly, when, after various wanderings, he found a protector in Margaret of Navarre. In 1534 he returned to Paris, but retired to Basel in the autumn of the same year. At Basel he completed and published his great work, The Institutes of the Christian Religion. In 1538 he was expelled from Geneva, but in 1541 his friends succeeded in effecting his recall, when he laid before the council the draft of his ordinances respecting church discipline, which were immediately accepted and published. Michael Servetus, passing through Geneva in 1553, was arrested, and through Calvin's instrumentality, was burned alive because he had attacked the mystery of the Trinity in a book which was neither written nor printed at Geneva. He was consulted upon points of law as well as of theology. Besides this, he found time to maintain a correspondence through all Europe. Up to 1561 the Lutherans and the Calvinists were as one, but in that year the latter expressly rejected the tenth article of the Confession of Augsburg, besides some others, and hence arose the name of Calvinists.

**Calvinism**, the theological tenets or doctrines of John Calvin, including a belief in predestination, election, total depravity, original sin, effectual calling, and the final perseverance of the saints.

**Caix** (L., lime or chalk), a term formerly applied to the *residuum* of a metal or mineral which has been subjected to violent heat, burning, or calcination.

**Calycan'thus,** a genus of hardy American shrubs, of which one species, Florida allspice. has yellow flowers, and is sweet-scented.

**Cal'ydon**, an ancient city of Northern Greece, in Ætolia, celebrated in Greek mythology on account of the ravages of a terrible boar. All the princes of the age assembled at the famous Hunt of the Calydonian Boar, which was finally despatched by Meleager.

**Calyp'so,** in Greek mythology, a nymph who inhabited the island Ogygia, on the shores of which Ulysses was shipwrecked. She promised him immortality if he would consent to marry her, but after a seven years' stay she was ordered by Hermes to permit his departure.

**Calyp' tra**, the hood of the theca or capsule of mosses. The same name is given to any hood-like body connected with the organs of fructification in flowering plants.

**Calyptræ'idæ**, a family of gasteropodous molluscs, known as bonnet or chambered limpets. The typical genus *Calyptræa* includes the cupand-saucer limpet.

**Ca**'lyx, in botany, the name given to the exterior covering of a flower, that is, the floral envelope consisting of a circle or whorl of leaves external to the corolla, which it incloses and supports. The parts or leaves which belong to it are called *\*epals*; they may be united

by their margins, or distinct, and are usually of a green color and of less delicate texture than the corolla. In many flowers, however, (especially monocotyledons), there is little or no difference in character between calyx and corolla, in which case the whole gets the name of *perianth*. When the calyx leaves are distinct the calyx is called *polysepalous*; when united, gamosepalous or monosepalous.

**Cam**, in machinery, a simple contrivance for converting a uniform rotary motion into a varied rectilinear motion, usually a projecting part of a wheel or other revolving piece so placed as to give an alternating or varying motion to another piece that comes in contact with it and is free to move only in a certain direction.

**Camaieu** (ka-mā'ū), monochrome painting or painting with a single color, varied only by gradations of the single color, by light and shade, etc. Drawings in Indian ink, sepia, etc., are classed as works *en camaieu*.

Cambacérès (kän-bå-sā-rå), JEAN JAQUES RÉGIS DE, Duke of Parma (1753-1824), a famous French statesman. He was trained a lawyer, and was appointed to various judicial offices. He declared Louis guilty, but disputed the right of the Convention to judge him, and voted for his provisory arrest, and in case of a hostile invasion, death. When Bonaparte was first consul, Cambacérès was chosen second. After the establishment of the empire, Cambacérès was chosen arch-chancellor, grand officer of the Legion of Honor, and ultimately duke of Parma. He was banished on the second restoration of Louis XVIII, but was subsequently permitted to return.

**Cam'bay**, a feudatory state in India, Bombay presidency. Area 350 sq. mi.; pop. 80, 722. Also chief town of above state, situated at the head of the Gulf of Cambay, formerly a flourishing port, but now decayed. Pop. 31,390. The gulf separates the peninsula of Kathiawar from the northern coast of Bombay, having a length of about 80 mi., and an average breadth of 25 mi.

**Cambo' dia** (or Cambo' ja), a country in the Indo-Chinese peninsula. The greater part of it is low and flat with numerous streams, the chief being the Mekong. The soil is very fertile, producing large quantities of rice, and the vegetation generally is marked by tropical luxuriance. Cattle are exceedingly numerous; among wild animals are the elephant and tiger. Gold and precious stones are found. In early times Cambodia was a powerful state exacting tribute even from Siam, but it gradually fell into decay, and in the last and early in the present century lost a large part of its dominions to Siam. Magnificent ruins, bridges, etc., attest the former prosperity of the country. Since 1863 it has been a protectorate of France, and since 1884 practically a French colony, though nominally ruled by a king of its own. The chief town is Pnom-Penh on an arm of the Mekong; the port is Kampot, on the Gulf of Siam. Area 38,560 sq. mi; pop. 1,700,000, partly Cambodians proper, partly Siamese, Annamese, etc. •**)**g

## Cambral

**Cambrai** (kim-brā), a fortified French city, on the Scheldt, in the dep. Du Nord, 104 mi. n.e. of Paris; long celebrated for its manufactures of fine liness and lawns, whence similar fabrics are called *cambrics*. It is the seat of an archbishop, and has a cathedral, an archiepiscopal palace, townhouse, etc. Pop. 24,122. *The League of Cambrai*, a league formed in 1508 between Louis XII of France, the German Emperor Maximilian, and Ferdinand of Spain, for the purpose of humbling the republic of Venice, and which was joined in 1509 by Pope Julius II.

**Cambrian Rocks**, in geology, an extensive series of gritstones, sandstones, conglomerates, slates, and shales, lying under the Lower Silurian beds, and above the Archæan, and divided into the Upper and Lower Cambrian. Many fossils occur in the series, including sponges, starfishes, trilobites, brachiopods, lamellibranchs, pteorpods, gasteropods, cephalopods, etc. They may be regarded as the bottom rocks of the Silurian system, and are well developed in North Wales (hence the name), but can be recognized in many other regions.

regions. **Cam'bric**, originally the name of a fine kind of linen which was manufactured principally at Cambrai, in French Flanders, whence the name. It is now applied to a cotton fabric, which is very extensively manufactured in imitation of the true fabric, and which is in reality a kind of muslin.

Cam'bridge (kām'brij), an inland county of England. Area 859 sq. mi. Pop. 196, 269. The soil is diversified and generally fertile; a large part belongs to the fen country. By drainage much of the fen land (including the Bedford Level) has been converted into arable land and pastures, and about nine tenths of the county is under cultivation. The county town is Cam-bridge; other towns are Ely, Wisbech, Newmarket, and March. Cambridge, the county town, is situated on the river Cam, 50 mi. n. of London. It is an ancient place, and was a Roman station (Granta). It occupies a perfect level encompassed by the colleges, and their beautiful grounds and gardens, on both sides of the Cam. Several of the streets are narrow and winding, but some are spacious and airy, and much improvement has taken place of late years. The town is supported mainly by the presence of the university; but has some

manufactures. Pop. 44,330. **Cambridge**, GEORGE WILLIAM, DUKE OF, b. in Hanover, March 26, 1819. He is the grandson of Adolphus Frederick, first duke of Cambridge, is grandson of George III, and first cousin of Queen Victoria. From 1856 to 1896 he was commander-in-chief of the British forces, and in 1861 was made a field marshal.

**Cambridge**, UNIVERSITY OF, one of the two great English universities, as old at least as the thirteenth century, situated in the above town. The following list contains the names of the colleges or distinct corporate bodies comprised in the university, with the time when each was founded: St. Peter's College, or Peter House (1257); Clare College, formerly

# Cambyses

Clare Hall (1326); Pembroke College (1347): Gonville and Caius College (1348); Trinity Hall (1350); Corpus Christi College (1352); King's College (1441); Queen's College (1448); St. Catherine's College, or Catherine Hall (1473); Jesus College (1496); Christ's College (1505); St. John's College (1511); Magdalene College (1519); Trinity College (1546); Emmanuel College (1584): Sidney Sussex College (1598); Downing College (1860); Cavendish College (1873); Selwin College (1882); Ayerst Hall (or Hostel) 1884.

Each of these colleges is a separate corporation which is governed by laws and usages of its own, although subject to the paramount The university is laws of the university. composed of a chancellor, vice chancellor, the masters or heads of colleges, fellows of colleges, and students, and is incorporated as a society for the study of all the liberal arts and sciences. The senate, which is composed of all who have taken the degree of Doctor or Master, is the great legislative assembly of the university. The chief executive power is vested in the chancellor, the high-steward. and the vice chancellor, who is the head of some college. Two proctors superintend the discipline of all pupils. Women who have fulfilled the conditions of residence and standing may be admitted to the examinations. Those who pass are placed in the published lists, and receive certificates; but no degrees conferred upon them. Two colleges (Girton and Newnham) have been established for women; but they are no part of the university, though many of the university lectures are open to stu-dents of these colleges. The annual income of the university was recently about \$150,000, arising from various sources, including the produce of fees at matriculation, for degrees, etc. The number of undergraduate students is about 3,000. There are over forty professors in the various departments. A botanic garden, an anatomical school, an observatory, and a valuable library, containing more than 300,000 printed volumes, besides many manuscripts, are attached to the university. The new museums and laboratories for the study of science are among the most complete in the country. The university sends two members to the House of Commons. The right of election is vested in the members of the senate.

**Cambridge**, Middlesex co., Mass., on Charles River, 3 mi. from Boston, with which it is connected by street railway. Railroad, Fitchburg. Industries: musical instruments, glassware, furniture, soap and candles, printing and publishing, etc. Cambridge is the seat of Harvard University, one of the foremost educational institutions in the country, founded in 1638. Pop. est. 1897, 80,000.

**Cambyses**, 1, a Persian of noble blood, to whom King Astyages gave his daughter Mandane in marriage. Astyages was dethroned by Cyrus, the offspring of this union. 2, The son of Cyrus the Great, and grandson of the preceding, became, after the death of his father, king of the Persians and Medes, B.C. 520. In the fifth year of his reign he invaded

## Camden

Egypt, conquering the whole kingdom within six months. But his expeditions against the Ammonites and Ethiopians having failed, his violent and vindictive nature broke out in cruel treatment of his subjects, his brother Smerdis and his own wife being among his victims. He died in 521 B.C.

Camden, WILLIAM (1551-1623), a noted British antiquary and historian. Appointed second master of Westminster School, he devoted all his leisure to the study of British antiquities, and began to collect matter for his great work, the Britannia, which gives a topographical and historical account of the British Isles from the earliest ages. He d. at Chiselhurst, in Kent, in the house which was afterward that of Napoleon Ill.

Camden, Camden co., N. J., on Delaware River opposite Philadelphia. It is a prominent railroad center, being the terminus for five Manufacturing and commercial inroads. terests are very extensive. Among the principal industries are large iron foundries, steel pen works, woolen and cotton mills, nickel refinery, fertilizers, chemicals, dyes, paints, oil-cloths, shawls, machinery, etc. It also has several large shipyards, and is a port of entry.

Camel, a genus of ruminant quadrupeds, characterized by the absence of horns; the possession of incisive, canine, and molar teeth; a fissure in the upper lip; a long and arched neck; one or two humps or protuberances on the back; a broad, elastic foot, ending in two small hoofs, which does not sink readily in the sand of the desert. The native country of the



Camel.

camel is said to extend from Morocco to China. within a zone of 900 or 1,000 mi. in breadth. The common camel, having two humps, is only found in the northern part of this region, and exclusively from the ancient Bactria, now Turkestan, to China. The dromedary, or single hump camel, or Arabian camel, is found throughout the entire length of this zone, on its southern side, as far as Africa and India. The Bactrian species is the larger, more robust, and more fitted for carrying heavy burdens. The dromedary has been called the

# **Camel's** Thorn

race horse of its species. To people residing in the vicinity of the great deserts, the camel is an invaluable mode of conveyance. It will travel three days under a load, and five days under a rider, without drinking. The stronger varieties carry from 700 to 1,000 lbs. burden. The camel's power of enduring thirst is partly

due to the peculiar structure of its stomach, to which are attached little pouches or water cells, capable of straining off and storing up water for future use, when journeying across the desert. It can live on little food, and of the coarsest kind, Part of the inside of Stomachleaves of trees,

nettles, shrubs,



paunch of Camel, showing the water cells.

twigs, etc. In this it is helped by the fact that its humps are mere accumulations of fat (the backbone of the animal being quite straight), and form a store upon which the system can draw when the outside supply is defective. Hence the camel driver who is about to start on a journey takes care to see that the humps of his animal present a full and healthy appearance. Camels which carry heavy burdens will do about 25 mi. a day, those which are used for speed alone, from 60 to 90 mi. a day. The camel is rather passive than docile, showing less intelligent co-operation with its master than the horse or ele-It lives from 40 to 50 years. Its flesh is es-teemed by the Arab, and its milk is his common food. The hair of the camel serves in the East for making cloth for tents, carpets, and wearing apparel. It is imported into European countries for the manufacture of fine pencils for painting, and for other purposes. The South American members of the family constitute the genus to which the llama and alpaca belong: they have no humps.

Camellia (ka-mel'ya), a genus of plants, of the tea order, with showy flowers and elegant dark green, shining, laurel like leaves, nearly allied to the plants which yield tea, and named from George Joseph Kamel, a Moravian Jesuit. The C. japonica, in Japan and China, is a lofty tree of beautiful proportions. It is the origin of many double varieties of our gardens. Besides this species, the C. sasangua, with small, white, scentless flowers, and the C. reticulatta (net-veined), with its large, peony-like flowers. are cultivated in America.

Camel' opard, a name given to the giraffe, originally from the notion that it was a kind of hybrid between a camel and leopard. It constitutes the only species of its genus and family. See Giraffe.

Camel's Thorn, a name of several plants. They are half shrubby plants growing in the deserts of Egypt and the East, and derive their name from the fact that they afford a



#### Cameo

food relished by camels. Some of the species yield a manna-like exudation from the leaves and branches.

**Cam'eo**, a general name for all gems cut in relief, in contradistinction to those hollowed out, or *intaglios*. More particularly, a cameo is a gem composed of several different colored layers having a subject in relief cut upon one or more of the upper layers, an under layer of a different color forming the ground. For this purpose the ancients used the onyx, sardonyx, agate, etc. The shells of various molluses are now much used for making cameos; and they are also imitated on glass.



Camellia Japonica.

Cam'era Lucida (L., "clear chamber"), an optical instrument employed to facilitate the sketching of objects from nature by producing a reflected picture of them upon paper. Wollaston's apparatus is one of the commonest. The essential part is a totally reflecting prism with four angles, one of which is 90°, the opposite one  $135^{\circ}$ , and the other two each  $67^{\circ} 30^{\circ}$ . One of the two faces which contain the right angle is turned toward the object to be sketched. Rays falling in a straight line on this face are totally reflected from the face to the next face whence they are again totally reflected to the fourth face, from which they emerge in a straight line. An eye placed so as to receive the emergent rays, will see an image of the object, and by placing the sketching paper below in this place, the image may be traced with a pencil. As the paper, for convenience of drawing, must be at a distance of about a foot, a concave lens, with a focal length of something less than a foot, is placed close in front of the prism in drawing distant objects. By raising or lowering the prism in its stand, the image of the object to be sketched may be made to coincide with the plane of the paper. The prism is mounted in such a way that it can be rotated either about a horizontal or a vertical axis: and its top is usually covered with a movable plate of blackened metal, hav-

#### Cameron

ing a semicircular notch at one edge, for the observer to look through. This form of camera has undergone various modifications. It is very convenient on account of its portability.

very convenient on account of its portability. Cam'era Obscu'ra, (L., "dark chamber") an optical instrument employed for exhibiting the images of objects in their forms and colors, so that they may be traced and a picture drawn, or may be represented by photography. A simple camera obscura is presented by a darkened chamber into which no light is permitted to enter excepting by a small hole in the window-shutter. A picture of the objects opposite the hole will then be seen on the wall, or on a white screen placed opposite the opening. The rays of light passing through a convex lens, being reflected from the mirror. (which is at a slope of  $45^{\circ}$ ) to the glass plate. where they form an image that may be traced. Another arrangement is a kind of tent surrounded by opaque curtains, and having at its top a revolving lantern, containing a lens with its axis horizontal, and a mirror placed behind it at a slope of 45°. to reflect the transmitted light downward on the paper. It is still better to combine lens and mirror in one by using a glass of peculiar shape, in which rays from external objects are first refracted at a convex surface, then totally reflected at the back of the lens, which is plane, and finally emerge through the bottom of the lens, which is concave, but with a larger radius of curvature than the first surface. The camera obscura employed by photographers is commonly a box. one half of which slides into the other, with a tube in front containing an object glass at its extremity. At the back of the box is a slide of round glass, on which the image of the object or objects to be depicted is thrown, in set-ting the instrument. The focusing is performed in the first place by sliding the one half of the box into the other, and by means of a pinion attached to the tube in front which moves the lens. When the image has thus been rendered as sharp as possible, the groundglass slide is removed, and a sensitized plate substituted, which not only receives, but retains the image.

**Cameron**, ANGUS, American statesman, b. 1826; removed to La Crosse, Wis., in 1857, and served several terms in the state legislature. From 1875 to 1885 he was U. S. senator from Wisconsin.

**Cameron**, JAMES DONALD, b. 1833. American statesman, son of Simon Cameron; became connected with railroads and iron manufacturing. From 1876 to 1877, he was secretary of war under President Grant, and was then chosen U. S. senator. He was re-elected in 1874 and 1875.

**Cameron**, RICHARD, a Scottish Covenanter. b. at Falkland in Fife. Becoming an enthusiastic votary of the pure Presbyterian system. on June 20, 1680, at the head of a small band of followers, he entered Sanquhar, and formally renounced allegiance to the king (Charles II) on account of his misgovernment. The little band kept in arms for a month in the mountainous country between Nithsdale and

Ayrshire, but were at length surprised by a much superior force at Aird's Moss, and after a stubborn fight overcome. Cameron was among the slain. See *Cameronians*.

**Cameron,** SIMON (1799-1889), American statesman, b. in Lancaster co., Pa. He edited a newspaper in Harrisburg in 1822. He was elected to the U. S. Senate in 1845, and supported the Mexican War. In 1856 was again elected senator. He was a formidable candidate in the Chicago Convention of 1860, but was defeated by Lincoln, who on becoming president appointed Cameron secretary of war. He resigned in 1862, and was sent as minister to Russia. In 1866 he again became U. S. senator, and held that office until 1877, when he was succeeded by his son.

when he was succeeded by his son. **Cameron**, VERNEY LOVETT, African traveler, b. 1844. He entered the British navy in 1857, and in 1872 was chosen to conduct an expedition for the relief of Dr. Livingstone. He was only in time to meet the remains of Livingstone at Unyanyembe, but continued his journey west to Benguela, and was thus the first to cross Central Africa. In 1878 he made a journey through Asia Minor and Persia. He published accounts of both journeys in his Across Africa and Our Future Highway to India.

**Cameroons,** 1, a district on the w. coast of Africa, on the Bight of Biafra, belonging to Germany, and one of the suitable districts for colonization in this region. 2, a river in the Cameroons territory. There are several large and thriving towns (including King Bell's town) on the river, through which an extensive trade is carried on in ivory and palm oil. 3, a mountain range in the territory, the highest peak of which has been estimated at over 13,000 ft.

**Camil'ius,** MARCUS FURIUS, a Roman patrician, famous as the deliverer of the city of Rome from the Gauls. In B.C. 396 he was made dictator during the Veientine War, and captured the town of Veii by mining, after it had defied the Roman power for ten years. In B.C. 394 Camillus besieged the Falerii, and by an act of generosity induced them to surrender. Camillus was appointed dictator a second time, and was successful in repelling the invaders. After having been four times appointed dictator, a new invasion of the Gauls called Camillus, now eighty years old, again to the front, and for the fifth and last time, being appointed dictator, he defeated and dispersed the barbarians. He d. in B.C. 365.

**Cam'oens**, LUIS DE (1524-1579). the most celebrated poet of the Portuguese. He became a soldier, and served in the fleet which the Portuguese sent against Morocco. He landed at Goa, India, but, being unfavorably impressed with the life led by the ruling Portuguese there, wrote a satire which caused his banishment to Macao (1556). Here he wrote the earlier cantos of his great poem, the *Lusiads*. Returning to Goa in 1561, he was shipwrecked and lost all his property except his precious manuscript. After much misfortune Camoens in 1570 arrived once more in his

native land, poor and without influence, as he had left it. The *Lusiads* was now printed at Lisbon (1572). The *Lusiads* is an epic poem in ten cantos. Its subject is the voyage of Vasco da Gama to the East Indies; but many other events in the history of Portugal are also introduced.

Camomile. See Chamomile.

**Camor'ra**, a well organized secret society. once spread throughout all parts of the kingdom of Naples. At one time the Camorristi were all-powerful, levying a kind of blackmail on all markets, fairs, and public gatherings, claiming the right to settle disputes, hiring themselves out for any criminal service, from the passing of contraband goods to assassination. It had central stations in all the large provincial towns, and a regular staff of recruiting officers. Though properly a secret society, it did not find it necessary under the régime of the Bourbons to conceal its operations; but under the present government of united Italy. the society, if it has not quite ceased to exist, has lost almost all its power, except in the wilder parts of Southern Italy. See Mafia and Vendetta.

**Campagna** (kåm-pån-yå) a town of s Italy, province of Salerno, surrounded by high mountains. It is the seat of a bishopric, and contains a superb cathedral. Pop. 9,028. **Campagna di Roma** (kåm-pån'yå), the coast region of Middle Italy, in which Rome

is situated, from 30 to 40 mi. wide and 100 long, and forming the undulating mostly uncultivated plain which extends from near Civita Vecchia, or Viterbo to Terracina, and includes the Pontine Marshes. The district is volcanic, and its lakes, Regillus, Albano, Nemi, etc., are evidently craters of extinct The soil is very fertile in the volcanoes. lower parts, though its cultivation is much neglected, owing to the malaria which makes residence there during midsummer very dangerous: and during the months of July, August, and September its inhabitants, chiefly herdsmen and peasants, seek refuge in Rome or the neighboring towns. In ancient times the Campagna, though never a salubrious district, was well cultivated and populated, the villas of the Roman aristocracy being numerous here.

**Campa' nia**, the ancient name of a province of Italy, in the former kingdom of Naples, which, on account of its beauty and fertility, was a favorite resort of wealthy Romans, who built there magnificent country houses. It comprises the modern provinces of Caserta, Naples, and parts of Salerno and Avellino. Cumæ (the oldest Greek settlement in Italy). Puteoli, Naples, Herculaneum, Pompeii, Baiæ, Stabiæ, Salernum, and Capua (its ancient capital) were the principal cities of Campania. Even now Campania is the most beautiful and fruitful part of Italy.

**Campanile** (kam-pa-nē'lā), a bell tower detached from the church to which it belongs, common in the church architecture of Italy. Among the most remarkable examples are the beautiful campanile of the cathedral at Flor-

.



#### Campanula

ence, designed by Giotto. and the famous leaning tower of Pisa.

**Campan' ula,** the bell-flower genus. a large genus of plants which gives its name to the order Campanula-ceæ. The species are herbaceous plants, with bellshaped flowers usu-ally of a blue or white color. It includes several American species, which are known to all lovers of wild flowers. The harebell or rock-bell flower, found in all the states on damp rocks and rocky streams, is an exceedingly delicate plant.



lant. Canterbury Bell. Campbell, SIR COLIN. See Clyde, Lord.

**Campbell**, SIR ALEXANDER, b. 1822, a Canadian statesman, went to Canada when a boy, and in 1843 was called to the bar of Upper Canada. In 1856 he was made queen's counsel. He sat in the Legislative Council of Canada before the union. In 1867 he was made postmaster general and afterward minister of the interior. In 1878 he was postmaster general and minister of the militia in the Liberal-Conservative administration. He entered the senate and became leader of the government party in that body; in 1881 was made minister of justice, and in 1885 postmaster general. In 1887 he was elected lieutenant governor of Ontario.

**Campbell,** ALEXANDER (1788-1806). American theologian. His father Thomas, a clergyman, came to this country in 1807. He spent a year in the University of Glasgow, and in 1809 came to America, and for a short time was pastor of a Presbyterian church. He became dissatisfied with that sect. His father sympathized with him, and in 1810 they formed a sect of their own, which they called the "Disciples of Christ." better known as "Campbellites." In 1840-41 he founded Bethany College, of which he was the first president, holding this office until his death.

ing this office until his death. **Campbell**, BARTLEY (1843-1888), American dramatist. He began his life as a newspaper reporter in Pittsburg, and founded the *Erening* Mail of that city in 1868. In 1871 he began writing for the stage, and produced Through Fire, and the following year Peril. Among his later plays were The Big Bonanza. My Partner, The Galley Slare, My Geraldine, and Siberia. Campbell died insane.

**Campbell**, JOHN (Lord Campbell) (1779-1861). lord chancellor of England. He is known as the author of a considerable work, *Lives of the Chancellors*, which with its supplementary vols., *Lives of the Chief Justices*, enjoyed great popularity.

#### Camphor.

**Campbell**, JOHN ARCHIBALD (1811-1889), American public man. He graduated at the University of Georgia in 1826, practised law in Alabama, and was a member of the legislature of that state. President Pierce made him an associate justice of the U.S. Supreme Court in 1853. He resigned in 1861 to become assistant secretary of war of the Confederacy.

Campbell, THOMAS (1777-1844), a noted English poet. After leaving Glasgow University he resided for a short time in Edinburgh, and all at once attained the zenith of his fame by publishing, in 1799, his Pleasures of Hope. In 1803, after spending some time in Germany, Campbell published an edition of the Pleasures of Hope with the addition of the lyrics Hohenlinden, Ye Mariners of England, and the Exile of Erin. In 1809 he published Gertrude of Wyoming, Lord Ullim's Daughter, and the Battle of the Baltic. He became editor in 1820 of the New Monthly Magazine. He took an active part in the foundation of London University. and in 1827 was elected rector of Glasgow University. He died at Boulogne, and was interred in the Poets' Corner, Westminster Abbey.

**Campeachy** (or Campeche), a seaport of Mexico, in the state and on the bay of the same name, on the w. coast of the peninsula of Yucatan, a mart for logwood and wax. Cigars are manufactured, and ships are built, though the harbor can only admit small vessels. Pop. 15, 196. The state Campeachy has an area of 25, 832 sq. mi., a pop. of 90,413.

**Camphene** (kam' fēn), the generic name for the volatile oils or hydrocarbons, isomeric or polymeric with oil or turpentine, as oil of bergamot, cloves, copaiba, hops, juniper, orange, pepper, etc. They are liquid at ordinary temperatures, and are distinguished from each other by their odors.

**Camphine** (kam'fēn), the commercial term for purified oil of turpentine, obtained by distilling the oil over quicklime to free it from resin. It is used in lamps, and gives a very brilliant light; but to prevent smoking, the lamp must have a very strong draught. With oxygen it forms camphor.

**Cam'phor**, a whitish, translucent substance, of a granular or foliated fracture, and somewhat unctuous to the touch, which is mostly extracted from two or three kinds of trees of the laurel tribe. It has a bitterish, aromatic taste and a strong characteristic smell. In chemical character it belongs to the vegetable oils. The common camphor of the shops is obtained from the camphor laurel, a native of China and Japan, now naturalized in many other countries. The camphor is chiefly prepared in the island of Formosa, though also exported from Japan, and to a small extent from China. The wood is cut into chips and distilled with water, the vapor of camphor rising with the steam being collected in the head of the still. After collection camphor oil drains off. In the refining process the grains of impure camphor are detached, and being introduced, along with a small proportion of quicklime, into a large globular glass vessel in quantities of about ten pounds, are reheated,



when first the water rises in steam, and is allowed to escape at a small aperture; and thereafter, this aperture being closed, the camphor sublimes and resolidifies in the interior upper part of the flask as a semi-transparent cake, leaving all the impurities behind. The flakes are then cooled and broken by throwing cold water on them, and the camphor taken out and sent into market. It is a white, tough solid, slightly lighter than water. It is very sparingly soluble in water, but freely soluble in alcohol, ether, acetic acid, and the essential oils. It fuses at 347°, and boils at 399°, but volatilizes somewhat rapidly at ordinary temperatures. When set fire to, it burns with a white, smoky flame. Thrown upon water, it floats, and may be set fire to. It has a peculiar hot, aromatic taste, and an agreeable characteristic odor. Bornco camphor is the product of a tree 100 to 130 ft. high, found in Borneo and Sumatra. Borneo camphor is not procured by distillation, but is found in masses, secreted naturally in cavities in the trunk and greater branches. Numerous other vegetables, such as thyme, rosemary, sage, etc., are found to yield camphor by dis-tillation. In medicine camphor is used both as an external and internal stimulant. In small doses it acts as an anodyne and antispasmodic; in large doses it acts as a poison. Its effluvia being very noxious to insects, it is much used to protect specimens in natural history. It readily dissolves in alcohol, oils, etc., and in this way is much used as a liniment. It evaporates or volatilizes at ordinary temperatures. A third kind of camphor, blumea camphor, is prepared in China from a tall, composite plant.

**Campi**, a family of Italian artists who founded what is known in painting as the school of Cremona. Of the four of this name, Giulio, Antonio, Vincenzo, and Bernardino, the first and the last are the best known. Giulio (1502-72), the eldest and the teacher of the others, was a pupil of Giulio Romano, and acquired from the study of Titian and Pordenone a skill in coloring which gave the school its high place. Bernardino(1525-90) was the greatest of the school. He took Romano. Titian, Correggio in succession as his models, but without losing his own individuality as an artist.

**Campobas' so,** a town of Italy, province of Campobasso, on a hill slope, 52 mi. n.e. Naples: has manufactures of cutlery, and a good trade. Pop. 14.818. The province (formerly Molise) has an area of 1,771 sq. mi.; pop. 385,140.

**Campobel** 10, an island 8 mi. long, belonging to New Brunswick, Canada, in the Bay of Fundy, with a lighthouse on its northern extremity.

**Campo Formio**, a town in Italy, 66 mi. n.e. of Venice, famous for the treaty of peace between Austria and France which was signed in its neighborhood on Oct. 17, 1797. Its chief provisions were that Austria should cede the Belgian provinces and Lombardy to France, receiving in compensation the Venetian states.

**Campo-Santo** (lit. "Holy Field"), the name given to a burying ground in Italy, best known

as the appellation of the more remarkable, such as are surrounded with arcades and richly adorned. The most famous Campo-Santo is that of Pisa, which dates from the twelfth century, and has on its walls frescoes of the fourteenth century of great interest in the history of art. Among more modern Italian cemeteries, that of Genoa is distinguished for its magnificence.

**Campus Martius** (called also *Campus*, merely), was a large place in the suburbs of ancient Rome, consisting of the level ground between the Quirinal. Capitoline, and Pincian hills, and the River Tiber, set apart for military exercises, and sacred to the god Mars. In the later period of the republic it was a suburban pleasure ground for the Romans, and was laid out with gardens, shady walks, baths, etc. Large part of the modern city stands on it.

**Camuccini** (kå-mut-chē' nē), VINCENZO (1775-1814), a distinguished Italian historical painter. He followed the pseudo-classical style, and his pictures are of large size. Among his best known works are Death of Casar, Death of Virginia, The Incredulity of Thomas, Horatius Cocles, Death of Mary Magdalene.

**Camwood**, a red dye-wood imported from tropical West Africa, and obtained from a leguminous tree. This wood is of a very fine color, and is used in turnery for making knife handles and other similar articles. The dye obtained from it is brilliant, but not permanent. It is called sometimes *Barwood*, though this name belongs to another tree.

**Cana**, a village of Palestine in Galilee, the scene of Christ's first miracle; probably represented by Kana el Jelil, a modern village 9 mi. n. of Nazareth.

Canaan (kā'nan). See Pulestine.

**Canaanites**, the general name for the heathen peoples (Jebusites, Hittites, Amorites, etc.) whom the Israelites found dwelling in Canaan (Palestine) west of the Jordan, and whom latterly they utterly subdued, though the subjugation was not quite complete till Solomon's time. They are believed to have been, in part, at least, of kindred race to the Israelites; and some authorities find traces of their descendants among the present inhabitants of Palestine.

Canada, DOMINION OF, an extensive series of British territories in North America, the greatest of Britain's colonial possessions, comprising the provinces of Ontario (formerly Upper Canada), Quebec (formerly Lower Canada), Nova Scotia, New Brunswick, British Columbia, Prince Edward Island, and Manitoba, along with the vast regions in the north and northwest known as the Northwest Territories, and another vast region north of Quebec known as the Northeast Territory. The Dominion thus embraces the whole of British North America, with the exception of Newfoundland and part of Labrador (which belongs to Newfoundland), and its area is not much less than that of Europe. The following shows the population of the provinces of the Dominion (some of which have recently had their boundaries altered), according to the census of 1891. British Columbia, 92,766; Manitoba, 154,442; New Brunswick, 321,294; Nova Scotia, 450,523; Ontario, 2,112,909; Prince Edward Island, 109,088; Quebec, 1,488,-586; Saskatchewan, Alberta, and Assiniboia, 61,487. Unorganized, 32,168. Total, 4,823,-344.

Nova Scotia, New Brunswick, and Prince Edward Island are called the "Maritime Provinces," though British Columbia, being on the Pacific, is also a maritime province. In the Northwest Territories four districts have been marked out: Assiniboia, area 95,000 sq. mi.; Saskatchewan, 114,000 sq. mi.; Alberta, 100,000 sq. mi.; Athabasca, 122,000 sq. mi. There is also the district of Kewatin, subordinate to Manitoba. The boundaries of the dominion are: the Atlantic on the east, the U. S. on the south, the Pacific and Alaska on the west, and the Arctic Ocean on the north.

Coasts.-On the east the coast line is very irregular, being marked by deep indentations and fringed by islands. The province of Nova Scotia forms an odd peninsula projection with the Bay of Fundy between it and the mainland, while north of it is the Gulf of St. Lawrence, shut in from the Atlantic by Cape Breton Island and Newfoundland. In the gulf are the Island of Anticosti and Prince Edward Island. The chief features of the north coast are the Archipelago of the Arctic islands and the great opening of Hudson's Bay, connected with the Atlantic by Hudson's Strait, and having as its southern continuation James Bay. On the west coast are Vancouver Island, the Queen Charlotte Islands, and many others. The southern boundary is most remarkable for The passing through the system of great lakes-Superior, Huron, Erie, and Ontario, between the last two of which are the Falls of Niagara,

partly belonging to Canada, partly to the U.S. To the Atlantic the drainage of these lakes is carried by the St. Lawrence with which river, and the great gulf into which it expands, are connected the provinces of Ontario, Quebec, New Brunswick, Nova Scotia, and Prince Edward Island, together containing by far the greater portion of the population of the dominion.

Surface.—Canada may be divided roughly into three great regions: a region of woodlands and hills or undulating ground in the e., a region of prairies in the middle, and a mountainous forest region in the w. The chief mountain ranges of the e. are n. and s. of the St. Lawrence, and run nearly parallel to that river. On the s. are the Shickshock Mountains and the Notre Dame range, the former rising to the height of 4,000 ft. On the n. is the Laurentian range (perhaps attaining 4,000 ft.), running in a westerly direction from the Labrador coast to the Ottawa River, and forming the watershed between the rivers which flow into the St. Lawrence and those which flow into Hudson's Bay. The prairie region and great wheat-producing tract extends n.w. of Lake Superior to the Rocky Mountains. This is a great region of plains, with low hills in some places: it is well wooded in many parts, else where bare or with a mixture of woodland and prairie. On the Pacific slope we have a distinctly mountainous region, including the Rockies, some peaks of which (Mt. Hooker, Mt. Brown) attain a height of about 16,000 ft., as also the Gold and the Cascade ranges.

Lakes and Rivers. - The vast lake and river systems which Canada possesses of its own, or shares with the U.S. give it a unique char-acter. Everywhere in the interior are rivers and lakes. To Hudson's Bay flow the Albany, Nelson, Churchill, and many other streams; to the Arctic Ocean, the Mackenzie, Coppermine, and Back or Great Fish River; to the Pacific, the Fraser, Skeena, Stickeen, etc. The basin of the St Lawrence, with the connected lakes Superior, Huron, Michigan, Erie, and Ontario. affords a continuous water way from the At-lantic to the interior of the continent. To this system belong the Ottawa, Gatineau, Richelieu, St. Maurice, Saguenay, and other rivers. In the prairie region and the northwest are similar great lake and river systems, formed by the Saskatchewan, Nelson, Churchell, Athabasca, and Mackenzie rivers, and the great lakes Winnipeg, Athabasca, Great Slave, and Great Bear. The Saskatchewan, lying in the heart of the rich, wheat growing district, must in time prove a far more important water way than at present. The Mackenzie and its connected lakes and rivers form the most remarkable feature of the far northwest. This river, including its tributary, the Peace, has a length of perhaps 2,500 mi., and drains an area of 550,000 sq. mi., or almost double that of the St. Lawrence basin. Between the Mackenzie system and Hudson's Bay is a great region called from its desolate character the Barren Grounds.

Geology and Minerals.-As regards the geological features of Canada, great part of the Dominion north of the St. Lawrence and west of Hudson's Bay is covered with archæan rocks belonging to the Laurentian system, and consisting largely of granite and gneiss, with quartz rock, schist, limestone, etc. South of the St. Lawrence, in New Brunswick and Nova Scotia, is a considerable development of Carboniferous strata. Between the archæan rocks and the Rocky Mountains is a great area of secondary (Mesozoic) strata. In the Rocky Mountain region the archæan, palæozoic. mesozoic, and tertiary systems are represented. Canada has great mineral wealth. Iron of the best quality has been found in great abundance in Quebec, Ontario, and British Columbia. The district round Lake Superior and the upper part of Lake Huron abounds in copper, and has much silver as well; and Nova Scotia, Assiniboia, Alberta, and British Columbia are rich in coal. In Nova Scotia there are a number of coal mines worked; gold is also ob-tained in some quantity, as well as iron. Coal is worked in the northwest, and more extensively in British Columbia; but the most valuable mineral of the latter is gold, of which more than \$50,000,000 has been obtained since 1858. British Columbia is also rich in iron. The chief oil district is the peninsula in the

## Canada

province of Ontario formed by Lakes Erie and Huron and the river St. Clair. Other useful mineral products are salt, gypsum, phosphate of lime, slate, asbestos, plumbago, antimony, and building stone.

Animals.-The chief wild animals (some of them represented by several species) are the deer, buffalo, musk-ox, bear, wolf, fox, otter, beaver, squirrel, raccoon, muskrat, marten, etc. The largest of the deer kind is the moose, or elk. The reindeer occurs in the north. The grizzly bear is met with in the Rocky Mountains, and the polar bear in the extreme north and northeast. Fur-bearing animals are so numerous as to have been a source of revenue to a large trading company like the Hudson's Bay company for over two centuries. There are birds in great variety, Canada having more than 700 of these altogether. They include the wild swan, wild turkey, geese and ducks of various kinds, partridges, quail, prairie-fowl, pigeon, woodcock, snipe, plover, etc ; besides eagles, hawks, owls, and many smaller birds, among which are two species of hum-ming-bird. Except at certain seasons game of all kinds may be shot at will. The rattlesnake and other snakes occur, but are less common than in the U. S. The seas, lakes, and rivers, especially the Gulf of St. Lawrence and the neighboring waters, abound in almost all kinds of fish, and the fisheries are extremely valuable, employing over 250,000 people, The chief sea fish caught are cod, herring, mackerel, halibut, haddock, hake, shad, salmon, etc. The rivers and lakes abound with salmon, whitefish, bass, trout. sturgeon, maskinonge, pike, pickerel, etc. The seal and whale fisheries are also valuable. Lobsters and oysters are abundant and excellent.

Vegetation. - The forests are of great extent, and the timber trade is a great source of wealth. In the forests grow more than sixty kinds of trees. Among the most valuable are the white and red pine, white and black spruce, maple, ash, beech, oak, walnut, but-ternut, chestnut, basswood, birch, cedar, etc. The forests of British Columbia produce the largest timber, the Douglas pine being the chief tree. The balsam poplar grows to an immense size on the Athabasca, Peace, and Mackenzie Rivers, and even at the mouth of the last, within the Arctic Circle, trees of some size are found. The sugar maple, a forest tree attaining the height of 120 ft. flourishes in the greater part of the St. Lawrence valley up to lat. 49°, and is much valued for the sugar that is obtained from it. There are a great many varieties of wild fruits, as the wild plum, wild cherry, raspberry, service-berry, cranberry, gooseberry, strawberry, black and red currant, wild vine, blueberry, buffalo berry, etc., and numerous wild flowers and flowering shrubs. Of the wild fruits, the raspberry, the cranberry, and the blueberry are alone important economically.

Climate. — The climate differs very much in different places. British Columbia on the Pacific coast, and Nova Scotia and the other Alantic regions are very dissimilar to the prairie region of the center. In Ontario and the region of the Upper St. Lawrence it may be described as temperate. Generally the climate of the Dominions shows considerable extremes of heat and cold, but, except in some of the coast regions, the exceeding dryness of the Canadian atmospheres makes both extremes of temperature pleasant and healthy. Apart from the portions of the Dominion that fall within the Arctic Circle, Labrador, and all the country e. of Hudson's Bay have the most severe climate. The Pacific coast region has a decidedly moist climate. The peninsula lying between Lakes Ontario, Erie, and Huron has the finest climate, allowing of fruits. shrubs, and flowers to be grown that cannot stand the winter elsewhere. The Mackenzie River district - especially in the region of the Peace River, where the temperature throughout the year is remarkably genial-possesses a climate much less severe than one might expect, and would allow of agriculture almost to the Arctic Ocean.

Agriculture.-Both by soil and climate Canada is specially adapted for agriculture. Within the last few years its agricultural importance has greatly increased, and when the great prairies are brought under cultivation Canada will be one of the chief agricultural countries in the world. In general, sowing is later than in the northern parts of Britain, but the harvest is gathered earlier, a large part of it usually before the end of July, so rapid is the growth during the hot Canadian summer. The chief crops are wheat, barley, oats, rye, maize, buckwheat, potatoes, turnips, mangle-wurzel. etc., and cattle, horses, and sheep are exported. The province of Ontario has an agricultural college and model farm at Guelph, and there are also model farms in Quebec. Fruit growing in now an important industry in certain localities, and large quantities of apples are exported, as well as canned and dried fruits. Peaches are grown to most advantage in the Niagara district of Ontario, where peach orchards many acres in extent are to be seen. The vine is cultivated too, and good wine is made. Pears, plums, and many kinds of berry

fruits, etc., are produced in great perfection. Commerce.—The trade of the Dominion is chiefly with the U. S. and Great Britain. About four fifths of the whole exports are sent to these two countries, while nearly nine tenths of the imports come from them. Besides timber, animals and their produce, and agricul-tural products, the chief articles of export are fish, coal and other minerals, leather, and The imports chiefly consist wooden goods. of manufactured goods, coal, iron, tea, coffee, sugar, cotton, etc. A uniform decimal system of coinage was established throughout the Dominion in 1871. The unit of account is the dollar of 100 cents, the value of which is declared to be on the basis of 486 cents and two thirds of a cent to the pound of British sterling money. The average rate of exchange makes the dollar equal to about 4s. The money used consists of bank bills, and gold, silver, and bronze coins, besides government notes of

#### Canada

small denominations up to 4 dollars, the bank bills being not of lower denominations than 5 dollars. There is a uniform system of weights and measures, the Canadian standards being the same as the British imperial standards. The British hundredweight of 112 pounds and ton of 2,240 pounds are, however, superseded by the U. S. weights of 100 pounds and 2,000 pounds respectively.

pounds respectively. Railways.—Of the railways the greatest is the Canadian Pacific Railway, running from Montreal across the whole continent to Vancouver on the Pacific coast in British Columbia; length about 2,900 mi. exclusive of branches. The Grand Trunk Railway connects the maritime provinces and the northeastern parts of the U.S., with the western railways. Another important railway is the Intercolonial Railway from Halifax in Nova Scotia to Quebec. Altogether the Dominion has now 14,633 mi. of railway. A railway has been begun to connect Winnipeg and Regina with Port Nelson on Hudson's Bay. This route will only be available for perhaps half of the year on account of ice in Hudson Strait and Bay.

Canals. - Some of the canals are stupendous The most important, from a achievements. commercial point of view, are the St. Law-The rence Canals and the Welland Canal. former series of canals, with an aggregate length of about 70 mi., avoids the rapids on the St. Lawrence between Montreal and Kingston on Lake Ontario, and thus affords to vessels the means of ascending to that lake (in descending vessels of 700 tons can shoot the rapids with safety); and the latter, with a length of 27 mi., avoids the Niagara falls and rapids, and enables vessels to ascend from Lake Ontario to Lake Erie. Both the Wel-land Canal and the St Lawrence series have been enlarged and deepened so as to accommodate the increased traffic expected as a result of the settlement of the northwestern provinces, and the construction of the Canadian Pacific Railway. The Rideau Canal connects Lake Ontario at Kingston with the Ottawa near the city of that name.

Constitution, Etc.-By the Act of Confederation of 1867 the constitution of the Dominion was required to be similar in principle to that of the United Kingdom. There is a central federal government and separate provincial governments and legislatures. The central executive government is vested in the sovereign of Great Britain and Ireland, and is carried on by a governor general appointed by the crown, and a privy council. The governor general has a salary of \$50,000 per annum. He is assisted by a privy council consisting of the prime minister and twelve other ministers or heads of de-partments. The legislative authority rests with a Parliament consisting of two houses, the Senate and the House of Commons. The The Senate consists of seventy-eight members, who are nominated by the governor general. Each senator must be a born or naturalized subject, thirty years of age, and possessed of real or personal property to the value of at least \$4,000

in the province for which he is appointed. The House of Commons is elected by the people for five years, there being one member for about every 20,000 of the population. There is a uniform franchise, a vote being given to every male of twenty-one years of age, pos-Each sessed of a small property qualification. of the provinces has a separate parliament and administration, independent in its own sphere, at the head being a neurenance of the pointed by the central government. Ontario, Manitoba, and British Columbia have only one the other provinces have two. The at the head being a lieutenant governor apadministration of justice is based on the English model, except in Quebec province, where the old French law prevails. The only court that has jurisdiction throughout the Dominion (except the Exchequer and the Maritime Court) is the Supreme Court, the ultimate court of appeal in civil and criminal cases. In certain cases an appeal may be had to Her Majesty's Privy Council. The capital of the Dominion is Ottawa, but the largest cities are Montreal. Toronto, and Quebec. Canada has both a large volunteer force and a militia. The former comprises many well equipped organizations in infantry, cavalry, and artillery.

Religion and Education.—There is no state church in the Dominion. The prevailing religion in Quebec is that of the Roman Catholic church. In Ontario Methodists predominate, then Presbyterians, the English Church, and the Roman Catholics. Of the total population in 1891, 1,791,892 were Roman Catholics, 742,-981 Methodists, 676,165 Presbyterians, 574,818 Anglicans. Education is well attended to, being everywhere more or less under the supervision of government, and excellent free schools being provided. In Ontario, Quebec, and Manitoba separate public schools are provided for Roman Catholics; in the other provinces the schools are unsectarian. All the colonies except British Columbia have universities or colleges.

People.-The total population, 1891, was 4,-820,411. Ontario is settled principally by emigrants from Great Britain and their descendants, with considerable numbers of Germans and Americans. In the province of Quebec the people are mostly French in origin, speech, and customs, being mainly descendants of the French colonists who inhabited the region before it became British. There are, besides, the Indian tribes and the Eskimo, the latter in the extreme north. The Indians are estimated to number about 130,000. They are divided into various tribes as well as larger stocks or races, such as the Tinneh or Athabascan Indians, the Thlinkets, and Hydahs of British Columbia and the west coast, the Algonquins, Hurons, Iroquois, etc., of the St. Lawrence region. In the old provinces separate land allotments have been granted to the Indian population. The majority of the Indians, however, live beyond the influences of this kind of civilization, and wander over the northwest, supporting themselves by fishing and hunting, carrying their furs to the forts or trading stations of the Hudson Bay Company.

History .- English ships were the first to reach the shores of what is now Canada. In 1497 John Cabot, sailing from Bristol, landed on the coast of Labrador, and planted the English flag there. But it was the French navigator Jacques Cartier who first really opened up Canada for European settlers. Some years later vigorous attempts at coloni-zation were made. The Sieur de Roberval was appointed Viceroy of New France, as the newly-discovered territory had been called, and under his leadership and that of Cartier two hundred colonists were landed, who, after struggling for two winters, had eventually to return. Martin Frobisher in 1576, and Sir Humphrey Gilbert in 1583, explored and took formal possession of Newfoundland and the adjacent coasts. In 1603 Samuel Champlain, a French naval officer, sailed up the St. Lawrence to where the city of Montreal now stands. At length, in 1608, a French Colony under the leadership of Champlain and Des Monts settled at Quebec. Two years later another En-glish navigator, Henry Hudson, explored the river and the bay which bear his name. In 1627, the fur trade having made considerable development under the guidance of Champlain, Cardinal Richelieu organized the company for the further colonization of New France. At Champlain's death in 1635 it numbered but 250 Europeans, and in 1663 was still under 2,000. The most formidable foes of the colonists were the Iroquois Indians. In 1663, Colbert being at the head of affairs in France, fresh supplies of emigrants and a strong body of troops were sent out to Canada. Under the governorship of Count de Fontenac the ex-ploration of Jesuit missionaries, and of the adventurers Joliet and La Salle, opened up the region of the Mississippi and the "Great West;" but the French generally preferred an adventurous life to the solid pursuits of agriculture.

The French did not altogether neglect industrial development; they laid the foundation of shipbuilding at Quebec, encouraged the fur trade and other industries; but in general their colonists lacked the qualifications for agricultural and other settled pursuits. The British colonists, on the other hand, stuck to agriculture, and reclaimed every year great tracts of forest land. As a natural consequence their population rapidly increased, and when the final struggle began, the British colonies in America numbered 3,000,000 of prosperous inhabitants against some 60.000 French colonists hampered by feudal tenures, commercial monopolies, and a corrupt set of officials. A little later occurred the incident of the expulsion of the Acadian peasants (immortalized in Longfellow's Erangeline), of whom about 7,000 still remained in Nova Scotia, mostly on the shores of the Bay of Fundy.

Canada was formally annexed to the British Empire, and in 1774 an act passed in the British Parliament (the Quebec act) extended the bounds of the province from Labrador to the Mississippi and from the Ohio to the watershed of Hudson's Bay. In 1775 the war of the American Revolution broke out, and Canada became the scene of a brief struggle between the royalists and the revolted colonists of New England. Thousands of American royalists sought new homes in Canada, and a large number settled on the St. John River, and had that district erected into the separate province of New Brunswick. More than 10,000 settled in Ontario, where they received liberal grants of land. In 1791 Canada was divided into two provinces-Upper Canada or Ontario, and Lower Canada or Quebec-the latter still retaining its seigneurial tenure and French law in civil cases. In Upper Canada British law and freehold tenure were introduced. From 1812 to 1815, war having broken out between Great Britain and America, Canada was again the theater of a bloody strife, among the chief incidents of which were Brock's victory over the Americans on the heights of Queenstown, and the battles of Chippewa, Lundy's Lane, Mora-vian's Town, etc. In 1837-38 the discontent of the people of Lower Canada with their system of irresponsible government took the form of a rebellion, which was repressed after a brief but sharp struggle. The year 1839 was distinguished by the celebrated "Boundary Dispute" between New Brunswick and the U.S. After threatening preparations on both sides the quarrel was settled in 1842 by the Ashburton Treaty, which fixed the forty-fifth parallel as the boundary line westward from the disputed territory to the St. Lawrence, and the forty-ninth parallel, from the Lake of the Woods to the Pacific, the central line of the Great Lakes and their connecting rivers completing the boundary. The result of the rebellion of 1837-38 and Lord Durham's report, was the reunion in 1841 of Upper and Lower Canada as one province with equal representation in the common legislature, and the practical concession on the part of the mother country of responsible government. Kingston was selected as the new seat of government, and three years afterward Montreal. In 1848 the Parliament House at Montreal having been burned in a riot, the seat of government was removed to Toronto and Quebec alternately every four years. In 1854 the Reciprocity Treaty with America was concluded, according to which there was to be free exchange of the products of sea and land, with navigation of the St. Lawrence, the St. John, and the canals, and the use of the inshore fisheries in the British waters to the Americans and of Lake Michigan to the Canadians. In 1858 Ottawa was finally selected as the capital of Canada, the choice having been referred to the queen. In 1866 the Reciprocity Treaty with the U.S. having expired, the government of that country practically refused to renew it except on the most disadvantageous terms for Canada. About the same time a Fenian expedition against Canada, originating in the U.S. began to be heard of. The filibusters crossed the frontier, were routed by the Canadian militia, and dispersed by American troops.

In 1867, March 28, the British North America act for confederation of the colonies passed

the imperial Parliament. It united Upper Canada or Ontario, Lower Canada or Quebec, New Brunswick, and Nova Scotia, into one territory, to be named the Dominion of Canada. Newfoundland declared against joining the confederation, but with that exception all the British territory north of the U.S. was gradually included within the Dominion-the Hudson Bay Company territory by purchase in 1868, British Columbia in 1871, Prince Edward Island in 1873. In 1870 an insurrection of the Red River settlers, who were under apprehensions as to how their titles to their lands might be affected by the cession of the Hudson Bay Company's rights, took place under the leadership of Louis Riel. To reassure the settlers, a part of the newly-purchased territory was erected into an independent province under the name of Manitoba, the unorganized territory beyond receiving the name of the Northwestern Territory. In 1871 the Washington Treaty arranged that the fisheries of both Canada and the U.S. should be open to each country for the next twelve years. Canada receiving a compensation, afterward fixed at five and a half million dollars, for the superior value of its fisheries. On Nov. 7, 1885, the Canadian Pacific Railway was completed, being opened for through traffic the following year. Since 1883, when the Washington Treaty expired, disputes between the American and Canadian fishermen have again been frequent, and several American fishing vessels have been seized on the British North American coasts, and others prevented from buying bait. For the adjustment of the differences connected with the fisheries, a joint British and American commission was instituted in 1887.

**Canada Balsam**, a fluid oleo-resin obtained from the balsam fir, common in Canada and the U. S., and also from Fraser's balsam fir and the hemlock spruce. It is used in medicine, and in making varnishes, etc.

**Canada Goose,** an American wild goose 30 to 35 in. long, brownish above, lighter below, head, neck, bill, and feet black, a white patch on the cheek; breeds in the north of the continent, and migrates southward when the frost becomes severe.

**Canada Hemp**, a perennial herb of the dogbane family, native of North America. It has a strong fiber used by the Indians for twine, nets, woven fabrics, etc.

**Canada Rice**, a floating grass growing in lakes and sluggish streams in Canada and the northern U. S., yielding a grain that forms part of the food of the Indians, and is eaten by whites also.

Canadian Pacific Ry. See Pacific Railways.

**Canadian River**, a river of New Mexico, Texas, and Indian Territory, a tributary of the Arkansas; length 900 mi. In 1897 a terrible cloudburst on its banks drowned many residents in the Indian Territory.

**Canal**, an artificial water-course for the transportation of goods or passengers by boats or ships, or for purposes of drainage or irrigation. The canals most familiar to ordinary

readers are for navigation. These consist usually of a number of different sections, each on one level throughout its course, but differing in relative height from the others. From one section to another boats are transferred by means of locks, or it may be by inclines or lifts. The lock is a water-tight enclosure with gates at either end, constructed between two succes-When a vessel is desive sections of a canal. scending, water is let into the lock till it is on a level with the higher water, and thus permits the vessel to enter; the upper gates are then closed, and by the lower gates being gradually opened, the water in the lock falls to the level of the lower water, and the vessel passes out. In ascending the operation is reversed. The incline conveys the vessel from one reach to another, generally on a specially constructed carriage running on rails, by means of drums and cables. The lift consists of two counterbalancing troughs, one going up as the other descends, carrying the vessel from the higher to the lower level, or vice versa. Works of great magnitude in the way of cuttings, embankments, aqueducts, bridges, tunnels, reservoirs for water supply, etc., are often necessary in constructing canals. Canals have been known from remote times, Egypt being intersected at an early period by canals branching off from the Nile to distant parts of the country, for purposes of irrigation and navigation. Under the Ptolemies, before the Christian era, there existed a canal between the Red Sea and the Nile. In China, also, canals were early made on a very large scale. In Holland, where the country is flat and water abundant, canals were constructed as early as the twelfth cen-tury. The lock, however, was not invented until the fifteenth century, both the Dutch and the Italians claiming the honor. Since then Europe has been provided with numerous canals, which being connected usually with navigable rivers, give access by water to most parts of its interior.

Among the numerous canals of Holland, the most important is now the great ship canal, from 200 to 300 ft. wide and 23 ft. deep, which connects Amsterdam with the North Sea. In France there are many canals and canalized rivers. the principal being the Canal du Midi, branching off from the Garonne at Toulouse, and falling into the Gulf of Lyons at Narbonne, thus connecting the Bay of Biscay and Mediterranean, and three canals connecting the basins of the Rhone, Loire, Seine, and Rhine. The canals of France have a total length of 3,000 mi. In Belgium there is the Ghent-Terneuzen Canal, which allows large vessels to sail to Ghent from the Scheldt estuary. The chief canals in Germany are the Ludwigs Canal in Bavaria, connecting (through the Main and Regnitz) the Rhine and the Danube; and the Holstein Canal, connecting the North Sea and Baltic by means of the Eider. The latter will be super-seded by the Great Baltic Canal for sea-going vessels, which is to be constructed at a cost of \$40,000,000, starting near the mouth of the Elbe and reaching the Baltic near Kiel. In Russla there is canal and river communica-

tion between the Caspian and the Baltic, large part of the route consisting of the Volga. In Britain one of the earliest and most celebrated is the Bridgewater Canal (1761-65), in Lancashire and Cheshire, with a length of 38 mi. In Scotland there are the Forth and Clyde Canal, 35 mi. long, joining these two rivers; and the Caledonian, 601 mi. (including lakes), from the Moray Firth on the east coast to Loch Eil on the west, passing through Loch Ness, Loch Oich, and Loch Lochy. In the British Islands there is a total length of canals of about 3,000 mi., more than five sixths being in England. In America the most extensive undertaking of this kind is the canal connecting the Hudson with Lake Erie. It is 363 mi. in length, and carries an immense traffic. In Canada the government has constructed, at great expense, the Welland Canal, uniting Lakes Erie and Ontario, and avoiding the Niagara River and its falls: and there are also other important canals. The greatest achievement in canalmaking has been the Suez Canal. It is an example of a canal without locks, open at both ends to the sea, and freely supplied with seawater.

Among the greatest canals now in use is the Manchester Ship Canal, opened in January, 1804, which connects Manchester with the Mersey, the Shropshire Union Canal, and the Weaver Navigation and Trent and Mersey Canal—the length is 35½ mi., breadth 172 ft., and the depth 26 ft.

On June 21, 1895, the Kaiser Wilhelm Canal was opened by the Emperor of Germany This C. connects the North and Baltic Seas by passing through Schleswig-Holstein from the northern side of the mouth of the Elbe to the western shore of Kiel Fiord. On June 3, 1887, the foundation stone was laid by the Emperor William I. Far back in the Middle Ages. schemes for uniting the two seals were considered, and plans and estimates were drawn up for carrying out the undertaking; yet it was not until the last century that a canal was actually formed. This was the Eider C., which, however, was suitable only for vessels of small draught. The Kaiser Wilhelm C. affords passage to the largest vessels affoat, and the squadrons of the different nations, represented at the opening ceremony, steamed through the C. from end to end without any difficulty or delay.

In 1881 a ship C. was commenced across the Isthmus of Panama, a distance of 46 mi. In 1888 the C. Company fell into monetary difficulties, and in the following year passed into liquidation. M. de Lesseps, the chief promoter of the scheme, retired from the management owing to failing health. Several of the directors were proceeded against criminally, and convicted of fraudulent practises in connection with the undertaking. In 1893 further attempts were made to organize a new company, and in 1894 the work was resumed as a tentative measure, but at the present time (1897) the whole matter is in suspense.

The alternative project and which found more favor in the U.S. was the Nicaragua Canal (which see). Expense and engineering difficulties have delayed this work. The Chicago Drainage Canal, blasted for miles through solid rock and destined to convey the waters of Lake Michigan into the Illinois River at Joliet, is one of the great engineering works of the century.

**Canal**, CHICAGO DRAINAGE, a channel for the removal of Chicago's sewage, begun Sept. 3, 1892, and one of the greatest engineering projects of the century. It is an undertaking of the Sanitary District of Chicago, which was organized in 1889, under the authority of the legislature. Trustees were elected by the people of Chicago in 1890. Some sections are excavated in solid rock, are 160 ft. wide, with perpendicular walls, and 30 to 35 ft. deep. When it is full earth-cut the bottom of the channel is 202 ft. wide. The full length of the channel is 28 mi. Its capacity per minute is 600,000 cubic ft; maximum velocity of current per hour, 3 mi.; length of spillway, 397 ft. About 6,000 men are employed in construction: the average amount of material removed daily is 60,000 cubic yards. This great work will probably be completed early in 1898, at an estimated cost of \$20,000,000. It is one of the most interesting places in the world for the study of glacial geology. The most important fact, however, regarding this wonderful channel, is that it completes a link in the chain of great waterways, which will some day connect the entire inland commerce of this country with that of South America, Asia, and the isles of the Pacific.

Much of the machinery used for handling material in excavating the canal has been invented since the work was commenced. The traveling cableways consist of two towers 700 ft. apart: the head tower is 93 ft. high and the tail tower is 73 ft. high. The head tower carries the engine, boilers, and machinery. The excavated material is dumped on the side of the canal which has the tail tower. A steel cable is stretched from tower to tower, directly across and high above the channel. On this cable travels a cable carriage which carries the pulley wheels and sheaves of the tackle that raises the loaded "skip" from the bed of the canal. The engineer does all the excavating except loading the skips. Each tower stands on trucks, the wheels of which run on tracks laid parallel to the channel. The skips are hoisted and travel over the cableway at the rate of 1,000 ft. a minute, and over 600 cubic vards of stone have been handled in 10 hours. Another machine is the cantalever conveyor. This machine resembles a swing bridge. One arm of the bridge extends over the working face, the other over the dumping bank. The inside arm is much lower than the outside. The cantalever is about 350 ft. long and is supported by a tower in the center, which rises from a platform on which is all the machinery for lifting the material and moving the can-talever. The bridge carries a track on which a trolley car runs. This car is hauled up and down by an endless cable. The skips have a capacity of 75 cubic ft., and each is lifted, run
out, and dumped on the spoil bank and returned to the pit in about 50 seconds. One of these conveyors has been known to remove 890 cubic yards in 10 hours and 45 minutes. Other machines used are revolving derricks which swing around on a turn-table like a swing bridge. The derrick has two long booms reaching out from a revolving tower. The skips are filled, lifted up, and swung around on the boom from the spoil bank. The channeling machine works upon a track laid along the edge of the rock channel with a long, heavy chisel shaped like the letter Z. It cuts a groove in the limestone nearly 3 in. wide and 10 or 12 it. deep. This cut makes a smooth wall for the channel and prevents injury to the sides from blasting.

**Canaletto.**—1, A Venetian painter (1697-1768), whose true name was Antonio Canale. He is chiefly celebrated for his pictures of Venice, and is said to have been the first to use the camera obscura for perspective, etc. 2, His nephew, BERNARDO BELOTTI (1724-1780), who was likewise a good artist, lived in Dresden, where he was a member of the Academy of Painters. The Canaletti developed the pictorial treatment of architecture to a very high point.

Canandaigua, Ontario co., N. Y., on Canandaigua Lake, 29 mi. s.e. of Rochester. Railroads: New York Central, Auburn Div.; N. Y. C., Batavia branch; and Northern Central. Industries: two flouring mills, two iron foundries, anti-rust tin works, brewery. factories for the manufacture of agricultural implements and pressed brick. Natural gas is found in limited quantities. The name Canandaigua is derived from the Indian "Canadarque," signifying "The Chosen Spot." The town was first settled in 1789, and became a village in 1815. Pop. est. 1897, 6,200.

Canary Bird, a singing bird, a kind of finch



### Norwich Canary.

from the Canary Islands. They were introduced into Europe 300 or 400 years ago. A large proportion of the cage canaries are really mules, produced by the interbreeding of canaries with allied species, such as the goldfinch, siskin, linnet, bullfinch.

**Canary Flower**, an annual climbing plant of the Indian cress family, a native of New Granada, cultivated in Europe for its showy yellow flowers.

Cana'ry Islands (or Canaries), a cluster of islands in the Atlantic, 60 or 70 mi. from the n.w. coast of Africa, and belonging to Spain. They are thirteen in number, seven of which are considerable, viz., Palma, Ferro, Gomera, Teneriffe, Grand Canary, Fuerteventura, and Lancerota. The other six are very small: Lancerota. The other six are very small: Graciosa, Roca or Rocca, Allegranza, St. Clara, Inferno, and Lobos. All are volcanic, rugged, and mountainous, frequently presenting precipitous cliffs to the sea. The princi-pal peak is that of Teneriffe, 12,182 ft.; El Cumber in Gran Canaria is 6,650 ft. The area of the whole has been estimated at 2,808 sq. Their fine climate and their fertility, mi. which owes little to cultivation, justified their ancient name of Fortunate Islands. There are no rivers of note, though streams are not infrequent. All the islands furnish good wine, especially Palma and Teneriffe. The exports amount to \$1,500,000 annually, and consist of cochineal, wine, raw silk, fruits, etc. Of the Guanches, the mysterious tribe who originally inhabited these islands, we know little. The islands were discovered and conquered by the Spaniards between 1316 and 1334; they then passed into the hands of the Portuguese, but were reconquered toward the end of the fifteenth century by the Spaniards, who extirpated the inhabitants, and now constitute the great bulk of the population. The fortified capital is Santa Cruz, and the city Laguna is the seat of the bishop (Roman Catholic). The Canaries form a Spanish province. Area 2,810

sq. mi. Pop. 291,625. **Canary Seed**, the seed of the canary grass. The seed is used as food in the Canaries. Barbary, and Italy, and is largely collected for canary birds. It has been successfully cultivated in England and the European continent

vated in England and the European continent. Cana'ry Wood, the light orange-colored wood of two trees of the laurel family, belonging to the Canaries and Madeira

Canby, EDWARD RICHARD S. (1819-1873), American soldier, b. in Kentucky. He graduated at West Point in 1839, served on the frontier and took an active part in the Mexican War. In 1861, he became colonel of the nineteenth U. S. infantry. During the draft riots in New York City in 1863, Canby, then a brigadier general, had command of the U. S. troops. As major general of volunteers, he captured Mobile. Gen. Richard Taylor surrendered to him the last Confederate army in the field. Iu 1873, Brigadier General Canby was sent, with two others, as a commission to treat with the Modoc Indians, who, under their chief, "Captain Jack," had sought refuge in the lava beds of Oregon. He was treacherously killed with his companions while under a flag of truce.

**Cancer** (L., a crab), in astronomy, the fourth sign in the zodiac, entered by the sun on or about the 21st of June, and quitted about the 22d of July. The constellation Cancer is no longer in the sign of Cancer, but at present occupies the place of the sign Leo.

Cancer (or Carcino' ma), a malignant growth of structure in some part of the human body, which can extend itself and spread to neighboring parts, and even form again after re-moval, and usually causes death. Cancer is divided into scirrhous, encephaloid, colloid, and epithelial cancer. Scirrhous cancer is a hard, firm, incompressible, and nodulated mass, at first non-adherent to the skin and attended with little or no pain. On section it is smooth and glistening, and exudes, on pressure, a small quantity of milky-looking juice. Encephaloid cancer is a soft elastic tumor, less circumscribed and increasing more rapidly than the preceding. It ends in a fungous vascular ulcer, to which the term fungus hamatodes has been given, and which has a great tendency to bleed. Colloid cancer occurs most frequently in the stomach and alimentary canal, and consists of fibers arranged so as to form loculi which contain a soft viscous matter of a yellowish, gravish, or reddish color. Epithelial cancer, occurring on the skin and mucous membranes, commences as a hard little tubercle, often resembling a wart, and like the other varieties ends in an ulcer with an ichorous discharge. Cancer is often a very painful disease, but in many cases is not attended with pain. No cure for it can be said to exist, though excision, if performed in time, may not be followed by a recurrence.

**Cancer Root** (or Beech Drop), an American parasitic plant, growing on the exposed root of the beech tree. The whole plant is powerfully astringent, and the root brownish, spongy, and of a very nauseous, bitter taste. It has been used in cases of cancer.

Can'dle, an artificial source of light, in the form of a long thin cylinder, or slightly conical rod, composed of fatty substances enclosing a wick of cotton rovings twisted or plaited together. Ancient Roman candles consisted of the pith of a kind of rush surrounded with tallow or wax. In England during the Anglo-Saxon period, ordinary candles were merely masses of fat plastered round splinters of wood. Candles are made by two processes, dipping and mokling, but chiefly the latter, and when well made they are white, hard, glossy, dry, and not greasy to the touch. Dips are made by stringing a number of twisted wicks upon a rod, and dipping repeatedly into a trough of melted tallow, allowing the dip to solidify after each immersion. Dipping is continued till the candles have acquired the requisite thickness. Molds are made with molds of thin pewter or glass, slightly taper-ing, which are arranged in a wooden frame with the narrow ends, which shape the points of the candles, downward. The wicks are stretched along the axes of the molds by means of wires, and the melted fat is then run into the molds. Next day the candles are withdrawn, cut, and trimmed at the base, and stored for use. In large manufactories, machinery is employed in molding as well as in dipping. Before use the tallow is purified by mechanical or chemical means of its fibrous tissue and other extraneous matter. Wax candles are seldom molded, on account of their adhesion to the molds, and contraction in cool-A different method of manufacture, ing. termed basting, is accordingly resorted to. Wax candles are still employed in the Catholic and Greek churches as indispensable accessories of the altar. Sperm candles are composed of spermaceti obtained from the brain of a species of whale, mixed with beeswax. Palm and cocoanut oils are now extensively used in candle making, and the enormous development of late years of this industry is to be attributed to the successful separation of stearic and palmitic acids from animal and vegetable fats. Stearine candles. - The stearic acid which abounds in animal fats, as beef and mutton suct, lard, etc., and in cocoanut oil, is the material of which these candles are made. Belmont sperm candles are made chiefly from palmitic acid obtained from palmitin, the principal ingredient in palm oil. The fat is raised to a high temperature, mixed with one twentieth of its weight of sulphuric acid; lime is added to neutralize the acid, and on distilling the product glycerine passes over first. Composite candles vary in composition. A beautiful transparent kind is made with nine tenths of stearic acid and one tenth of beeswax; another variety is formed of the stearic acid of tallow with the stearine of cocoanut oil.

Parafine candle manufacture is now carried on on a most extensive scale. They are much in demand on account of their cheapness and the clearness and brilliancy of their light. Electricity, gas, and the cheapness of mineral oils have done much to displace the commercial use of candles.

**Candleberry** (Candleberry Myrtle, Wax Myrtle, etc.), a shrub growing from 4 to 18 ft. high, and common in N. A., where candles are made from its drupes or berries, which are about the size of peppercorns, and covered with a greenish-white wax popularly known as Blayberry tallow. The wax is collected by boiling the drupes in water and skimming off the surface. A bushel of berries yields from 4 to 5 lbs. of wax. Another plant belonging to the same genus is the sweetgale, which grows abundantly in bogs and marshes in Scotland — a small shrub, with leaves somewhat like the myrtle or willow, of a fragrant odor and bitter taste, and yielding an essential oil by distillation.

**Candle Fish,** a sea-fish of the salmon family frequenting the northwestern shores of America, of about the size of the smelt. It is converted by the Indians into a candle simply by passing the pith of a rush or a strip of the bark of the cypress tree through it as a wick, when its extreme ofliness keeps the wick blazing. It is called also Oubichon.

**Can'dlemas**, a church feast instituted in 492 in commemoration of the presentation of

Christ in the temple and of the purification of Mary. It falls on February 2, and on this day among Catholics lighted candles are carried about in procession, and all candles and tapers which are to be used in the churches during the entire year are consecrated.

**Candle Nut**, the nut of a tree of India, the Moluccas, Pacific Islands, etc. It is about the size of a walnut, and yields an oil used for food and for lamps, while the oily kernels are also strung together and lighted as torches.

**Candy** (or Kandy), a city, Ceylon, near the center of the island, 72 mi. n.e. Colombo. The residence of the governor at the n.e. extremity is among the finest structures in Ceylon. Other noteworthy places are the Buddhist temple, called "the palace of the tooth," the most sacred in the Buddhist world, the old royal cemetery, the military magazine in the center of a lake, the government brick works, etc. Pop. 22,000.

Candy Making. The largest ingredient of candy is sugar. A small amount of glucose is added to the sugar to give it the proper consistency. This composition is boiled in water until the syrup is thick and almost clear. This syrup is then poured out upon huge marble slabs, where it is allowed to cool for a time. It is then worked by means of long iron paddles much as a plasterer would stir mortar. Under this treatment it becomes hard, white, and almost crystalline This process is sometimes carried on in copper kettles, which not , only cook the ingredients, but beat them white and hard by means of a rotating dasher. The candy is now ready to be cast into various sizes and shapes. Candy is cast in corn starch molds. The starch is placed in narrow, shallow boxes, and smoothed off at the top. The boxes are run under a press, the lower part of which is covered by projections of just the size required. When the press goes down a little hammer taps the top of it automatically, and the corn starch is punctured with rows of smooth, clear-cut holes. When the molds are complete, they are filled from a tank with cream candy. Marshmallows are cast in the cream candy. Marshmattows are called in the molds is some way. When the candy in the molds is taken to a machine dry and hard the boxes are taken to a machine called the "starch-buck." Here the starch and candy are dumped into a hopper, under which are a series of sieves. The starch falls through the meshes, and the candy is carried on through a series of brushes to take off the remaining starch. Chocolate creams are dipped by means of a little wire spoon, after which they are placed on a piece of oilcloth and set in a frame to dry. For the manufacture of lozenges and candy hearts the sugar is mixed cold in large tubs, and the lozenges are pressed out in molds. Mottoes are printed on the hearts with a rubber stamp. For the cocoanut candy the nuts are bought whole, and the hard white meat is taken out and placed in a kettle, where it is boiled and violently stirred at the same time by means of rotating dashers. Sugar is added, and when the mass is sufficiently cooked it is placed on a marble slab, and rolled down even with a long piece

of gas pipe. Cocoanut is colored and molded into various forms, and sliced up in strips with a patent cutting machine. Caramels are made of sugar and pure cream carefully boiled together until they are of proper consistency, and then poured on marble slabs to cool. They are then cut and wrapped. Hard candy is made of sugar boiled over an open fire and then colored in various shades. The batches are mixed and rolled out by hand until they are the size of an ordinary stick of candy, after which they are cut up into the regular lengths. Rock candy and many of the sugared nuts are made by the crystallization process. A tin box in which numerous strings run from top to bottom, is filled with sugar and set away in a warm place. The crystals of sugar form on the strings and harden there, thus making the well-known rock candy. In the same way crystals are allowed to form on almonds, and other nuts and fruit.

**Cane**, a term sometimes indiscriminately applied to any small and smooth rod, of the thickness of a walking stick or less; but more correctly limited to the stems of the smaller palms and the larger grasses. We thus speak of sugar cane, bamboo cane, etc., among the latter; while among the former this name is particularly appropriated to the species of the genus Calamus, also called Rattan (the Malay name or a corruption of it). To this genus belong the canes largely imported from the tropical regions of the East for making bottoms of chairs, couches, etc. See Walking stick.

**Cane'a** (or Khania), a seaport of Crete or Candia, on the north coast, the principal mart for the commerce of the island in wax, soap, oil, silks, fruits, wool, and provisions. Pop. 8,000.

**Canel'la**, WHITE, a tree belonging to the West Indies, growing to the height of 10 to 50 ft., with a straight stem branched only at the top. It is covered with a whitish bark, which is freed from its outward covering, dried in the shade, and brought to Europe in long quills, somewhat thicker than those of cinnamon. It is moderately warm to the taste, and is esteemed as a pleasing and aromatic bitter.

**Cane phorus**, one of the bearers of the baskets containing the implements of sacrifice in the processions of the Dionysia, Panathenea, and other ancient Grecian festivals, an office of honor much coveted by the virgins of antiquity. The term is applied to architectural figures bearing baskets on their heads, sometimes improperly confounded with Caryatides.

**Cane Sugar**, the product of the sugar cane plant (which see). The process of making cane sugar in Louisiana, the old method, is to bring the cane in from the field as fast as it is cut, and keep in a sufficient supply to run the mill night and day. The cane is dumped from the wagons on to a traveling platform which carries it to the roller mill, where it is crushed. The roller mill is a ponderous piece of machinery and very massive, for the sugar cane has a tough. hard skin and must be subjected to great pressure to secure its juice. Either three, five or nine rollers are used. As soon as the sugar

cane is crushed by this mill, it becomes "bagasse." The bagasse is carried to the boiler room where it is used as fuel under the boilers. When the cane and bagasse are crushed, the juice runs down, a greenish, sticky liquid, through a strainer, to a well or vat, from which it is pumped to the clarifiers. Here milk of lime is stirred in and heat is applied. The lime neutralizes the acids in the juice, for the moment the cane is cut a chemical change begins in the juice, part of it fermenting and becoming acid.

The thick scum which rises when the lime is stirred into the juice is removed, and the clarified juice is drawn off in a kettle where the old method of making sugar is used. Sometimes the juice is bleached by fumes of burning sulphur before it is taken to the battery. The juice is boiled to a syrup, and then to sugar in large, open kettles. In the first kettle the juice is boiled to a certain density which is determined by a sacchrameter. This is a tube-like affair which is divided into degrees, so that the sugar maker, by simply placing it in the juice, can tell when it has reached the proper density. The impurities which rise to the top are constantly skimmed off. The juice becomes syrup in the second kettle, and as it grows thicker it is transferred from one kettle to another. In the last kettle the syrup is cooked until it can be drawn out in a candied string. When the grain is felt, and the sacchrameter shows that the proper density has been reached, the heavy syrup is placed in cooling vats made of wood. As the syrup cools, the sugar crystallizes, but it is mixed with molasses which will not crystallize so it is scooped out of the cooling vat into large hogsheads made of cypress wood, which have a large number of holes bored in the bottom. Bits of sugar plug these holes loosely, allowing the molasses to drip down into the molasses tank. The sugar then goes to the refinery where it is granulated. Such is the old method of making sugar.

In the new method the juice and syrup go from the mill to the clarifiers and on to the finished product untouched by hand. After the juice has been treated with lime and sul-phur, it is dumped into the first clarifier. which has a steam coil in the bottom. From one to the other of the four clarifiers the syrup goes, being constantly skimmed, and when the proper density has been secured, the syrup is dumped into the settling tank, whence it goes to the vacuum pan. This pan is a close, spherical vessel with copper steam coils in the bottom, and can be made air tight. An air pump or condenser removes the air, thus making a vacuum. In a vacuum, liquid boils at a much lower temperature than 212<sup>o</sup>, the boiling point in open air; and as there is no atmospheric weight on the liquid, the heat causes the liquid to boil furiously at about 115<sup>o</sup>. By using the vacuum pan no sugar is burned, and the syrup does not become brown. The boiling continues until crystallization is effected, and then the valve at the bottom is opened, and the whole charge is

dumped into the mixer, directly under the vacuum pan. The mixer is a trough-like arrangement, in which a long shaft with steel arms revolves, mixing the sugar so that the crystallization progresses uniformly. This sugar, with its molasses, is shoveled into the centrifugal machine. This is a kettle-shaped vessel, which revolves about 1,200 times a minute. Its sides are perforated so that the molasses in the sugar caught up by the centrifugal force flies through the perforations, leaving the sugar dry and snow white. The sugar is then dumped into the granulator and placed in barrels. See Sugar Cane. **Canes Venatici** (kā'nēz vē-nat'i-sī) ("the

**Canes Venatici** (kā'nēz vē-nat'i-sī) ("the hunting dogs"), a northern constellation, within the limits of which several remarkable nebulæ occur.

**Canic' ula**, the dog star or Sirius; hence Canicular days, the dog days.

**Ca**' **nis**, the genus of animals to which the dog, wolf, and fox belong.

**Canis Major** ("the greater dog"), a constellation of the southern hemisphere, remarkable as containing *Sirius*, the brightest star. CANIS MINOR ("the lesser dog") is a constellation in the northern hemisphere, immediately above Canis Major, the chief star in which is *Procyon*.

**Canker**, 1, in medicine, a collection of small sloughing ulcers in the mouth, especially of children; called also water canker. 2, In horticulture, a kind of gangrenous disease to which fruit trees especially are liable, beginning in the younger shoots and gradually extending to the trunk. 3, In farriery, a disease in horses' feet causing a discharge of fetid matter from the cleft in the middle of the frog, generally originating in a diseased thrush.

**Caunabina**'ceæ, the order of plants to which only two plants, hemp and the hop, belong, closely allied to the nettle order.

**Caninge**, a town of South Italy, province of Bari, near the mouth of the Ofanto, formerly the Aufidus. Here the Roman army sustained a terrible defeat by Hannibal. The Romans numbered 80,000 infantry and 6,000 cavalry, whereas Hannibal's army consisted of 10,000 cavalry, but only about 40,000 infantry. Of the Romans 70,000 fell, including the Consul Lucius Paulus, and 80 men of senatorial rank. Hannibal lost not quite 6,000.

**Cannes** (kan), a seaport of France, on the shore of the Mediterranean, dep. Alpes-Maritimes; famous as a winter residence, and as the place where Napoleon landed when he returned from Elba, March 1, 1815. Pop. 19.385.

**Canning,** the name of three noted English statesmen. 1, CHARLES JOHN, Earl Canning (1812-1862), noted for his moderation in dealing with the Indian mutiny. 2, His father, GEORGE CANNING (1770-1827), a noted author and statesman. 3, STRATFORD CANNING, Viscount Stratford de Redcliffe (1788-1880), a noted English diplomatist.

**Canning Fruits and Vegetables.**— The process of canning fruits and vegetables is one of great interest and of increasing importance. The tomatoes, fruit, or corn are brought to the

29

### **Canning Fruits and Vegetables**

factory and dumped into bins at the end of a long, steamy room, where they are left until the workmen are ready to feed them into the mouth of the machine, from the farther end of which they are to roll all canned and labeled. The skins are loosened by an ingenious machine resembling a large steam boiler. In-side a great augur is kept boring away by means of a wheel connected by belting with the power shaft. The tomatoes, for instance, are dumped into a funnel-shaped hole at the lower end of the boiler and fall into a bath of hot water which stands at the bottom. The augur catches them and lifts them gradually cut. At the open end of the boiler there is a spout down which they slip into pails that are brought under it by means of a revolving table. These steaming pails are carried to the peelers, who by one or two quick movements remove the skin. The tomatoes are then dumped into the bin ready for the fillers, and filler is a great box which tapers off to a funnel at the bottom. There is a long chute on one The side. Into this empty tin cans are fed. tomatoes having been dumped into the box, they are crushed downward by means of a plunger into the mouth of the can which has slipped into the slot below. As soon as a can is filled the stream of tomatoes is cut off automatically, the full can moves on and an empty one takes its place. A large number of cans can be filled at the same time by this process. The full cans are then carried to the soldering machine, six at a time. This soldering is all done by automatic machinery. The sealing and cooking machine is more than fifty feet long, and two sections of it are enclosed in covered iron chambers. After the filled cans leave the soldering machine they are carried to the cooking machine. They descend into the first iron chamber and travel along through a bath of water raised to a temperature of  $212^{\circ}$ . A small vent hole is left in the cover of the cans for the escape of any surplus liquid. Eight minutes are required for the cans to pass through the first chamber. They are then carried to the soldering place, where the vent holes are closed. The cans then go into a shallow bath of water and close watch is kept for any bubbles, for such would indicate that some of the cansleak. The cans are next carried into the second chamber of hot water, where they are to remain thirty minutes until their contents are completely cooked. At the farther end they come out and after being dried, they are ready for the labeling machine.

The device for labeling is an automatic machine. The can is started at the top, and in rolling downward comes in contact with a paste-brush, and then strikes the pile of paper labels, and in passing downward it moves two swinging levers which turn the paste-daubers by means of a crank-wheel. The process of preparing peaches, pears, and corn, differ in some respects, but they are all substantially the same. The whole process is done by ten to fifteen men, and as many as 30,000 cans can be turned out in a single day. **Cannon**, JOSEPH G., b. 1836, American statesman; removed to Illinois and practised law; was states attorney 1861-68. In 1874 he was elected to Congress as a republican from the fifteenth district of Illinois and has held office by constant re-election ever since. He was chairman of the ways and means committee in 1894-96.

Cannon, a big gun or piece of ordnance. The precise period at which engines for projecting missiles by mechanical force (catapults, etc.) were supplanted by those utilizing explosive materials is a matter of controversy, the invention of cannon being even attributed to the Chinese, from whom the Saracens may have acquired the knowledge. A doubtful authority asserts their use at the siege of Belgrade in 1073; but they were certainly brought into use in France as early as 1338. At first they were made of wood, well secured by iron hoops, the earliest shape being somewhat conical, with wide muzzles, and afterward cylindrical. They were then made of iron bars firmly bound together with iron hoops like casks. Mons Meg at Edinburgh being a good example. Bronze was used in the second half of the fourteenth century, toward the close of which and during the fifteenth century castiron ordnance came into use. A form of breechloading cannon was introduced in the s'xteenth century. Cannon were formerly dignified with great names. Twelve cast by Louis XII were called after the twelve peers of France, and Charles V had twelve called after the twelve apostles. Later such names as the following came into general use; cannon royal, or carthoun, carrying 48 pounds; culverin, 18; demiculverin, 9: falcon, 6: basilisk, 48; siren, 60; Cannon were then named from the etc. weight of the balls which they carried: 6-pounders, 12-pounders, etc.; but are now usually, especially the large ones, designated by their weight, as a 25-ton gun, an 80-ton gun, Their caliber or diameter of bore is also etc. used in designating them.

Great improvements and changes in the manufacture of cannon have been introduced in recent times. Not so long ago they were all made of iron, brass, or gun-metal (a variety of bronze) by casting. The introduction of rifled small arms led the way to that of rifled cannon, and the adoption of heavy armor for ships of war rendered guns of enormous power and magnitude necessary in order to penetrate their sides. The increased inertia of the projectiles and their rapid rotation in these rifled guns tried the piece so severely that cast-iron and even bronze have been largely used.

The process of making modern cannon begins in the office of the factory draughtsman, and the drawings and figures of every dimension are made with the greatest accuracy. Specifications when completed go to the shop where the forgings of steel are all in waiting. The gun is made up of a central tube, covered by a jacket, and rings on the outside. The process of putting these pieces together is known as assembling, and the work is done in a shrinking pit. The gun goes through a

long course of lathes and boring machines: some of these lathes are 130 ft. long and have a swing of 8 ft., and are capable of boring a gun 50 ft. long and weighing more than 120 tons. The gun may be turned on the outside and bored on the inside at the same time. When a gun leaves the lathe it is carried along to a revolving machine by a traveling crane over-head. The revolving machine plows the interior surface of the gun with a spiral groove which gives the shell a rotary motion when fired. These cuttings are made to the thou-sandth part of an inch. The climax of the operation is the assembling of the gun. The principle of the whole process lies in keeping the tube of the cannon cool and expanding the jacket by means of hot air so it will slip easily over the tube. When the jacket cools it contracts and grasps the tube almost as closely as if they were one piece of metal. The heating is done entirely by hot air. In the pit there is one furnace filled with coils of pipe through which air is forced by a compressing pump. Underneath air is heated by a gas fire. In this condition it is forced into the cylindrical department in which stands the gun-jacket, after which it is passed off by a chimney. After the heating process has gone on for a day or two, the lid of the jacket apartment is lifted and the top of the cylinder of iron is measured to see if the expansion has made it large enough to fit over the tube. It is necessary that the inside diameter of the jacket be about one tenth of an inch greater than the exterior of the tube. The tube of the cannon is placed upright in the pit, with the upper 15 ft. smooth and shiny for the reception of the jacket. Inside of it cold water is kept flowing so that the steel will be as much contracted as possible. When all is much contracted as possible. When all is ready, the lid of the jacket apartment is thrown open and the traveling crane carries the jacket directly over the tube where it is accurately plumbed so that it will slip down over the tube without touching it. This op-eration must be performed very quickly so that the jacket will not contract too much. After the jacket has been put on, the gun remains in the pit for about two days to cool, when it is taken to the lathe again to be prepared for the hoops or cylindrical pieces of steel. Nine of these are shrunk on while the gun is in a horizontal position. The making of the gun carriage is another part of the work but does not require so much skill.

Ca'no, Alonso (1601-1664), a painter, sculptor, and architect, who has been called the Michael Angelo of Spain. He first made himself known by his statues for the great church of Lebrija, and was in 1638 appointed painter to the king. His wife having been murdered by a servant or pupil, he was suspected and put to torture; but his right arm was spared from respect for his talents. He afterward became a priest and was made a racionero (resident) of Granada, where he passed the remainder of his life.

**Cance** (ka-nö') (through the Spanish canca, from the native West Indian name), a light

## Canova

boat narrow in the beam, and adapted to be propelled by



paddles, often in conjunction with sails. The name was originally given 'to the boats of uncivilized races, but its application has been considerably extended, and canoes of home make may be seen on the waters of the most civilized coun-

Trapper's Canoe.

They are of the most diverse materials tries. and construction. Often they are hollowed out of a single log. The Indian cances of Can-ada are of bark on a wooden frame. The Eskimo kaiaks consist of a light wooden frame, covered with seal skins sewed together with sinews, and having only one opening to admit the boatman to his seat. In the islands of the Pacific the natives have double canoes, united by a strong platform, serving in this way as one vessel.

**Cañon** (kan-yon'), the Spanish word for tube, funnel, cannon; applied by the Spanish Americans, and hence in North America generally (often with the spelling canyon), to long and narrow river gorges or deep ravines with precipitous and almost perpendicular sides occur-ring frequently in the Rocky Mountains, the Sierra Nevada, and great western plateaus of North America.

Canonization, a ceremony in the Catholic Church, by which deceased persons are declared saints. The pope institutes a formal investigation of the miraculous and other qualifications of the deceased person recom-mended for canonization; and an advocate of the devil, as he is called, is appointed to assail the memory of the candidate. If the examination is satisfactory, the pope pronounces the beatification of the candidate, the actual years afterward, when a day is dedicated to his honor, his name inserted in the canon or Litany of the Saints in the Mass, and his remains preserved as holy relics.

Canon Law, a collection of ecclesiastical constitutions for the regulation of the Church of Rome, consisting for the most part of ordinances of general and provincial councils, decrees promulgated by the popes with the sanction of the cardinals, and decretal epistles and bulls of the popes. There is also a canon law for the regulation of the Church of England, which under certain restrictions is used in ecclesiastical courts and in the courts of the two universities.

Cano'pus, an ancient Egyptian city, between Alexandria and the western mouth of the Nile, once the chief harbor of the Delta. It had a popular temple of Serapis. Cano'va, ANTONIO (1757-1822), an Italian

sculptor. He went to the Academy of Venice, where he had a brilliant career. In 1779 he was sent by the senate of Venice to Rome and there produced his Theseus and the Slain Minotaur. In 1783 Canova undertook the execution of the tomb of Pope Clement XIV in the Church of the Apostles, a work in the Bernini manner, and inferior to his second public monument, the tomb of Pope Clement XIII (1792) in St. Peter's. He produced his group of Venus and Adonis, the Psyche and Butterfty, a Repentant Magdalene, the well-known Hebe, the colossal Hercules Hurling Lichas into the Sea, the Pugilists, and the group of Cupid and Psyche. In 1796 and 1797 Canova finished the model of the celebrated tomb of the Archduchess Christina of Austria, and in 1797 made the colossal model of a statue of the king of Naples executed in marble in 1803. He afterward executed in Rome his Perseus with the Head of Medusa, which, when the Belcedere Apollo was carried to France, was thought not unworthy of its place and pedestal. In 1802 he was invited by Bonaparte to Paris to make the model of his colossal statue. Among the later works of the artist are a colossal Washington, the tombs of the Cardinal of York and of Pius VII; a Venus Rising from the Bath; the colossal group of Theseus Killing the Minolaur; the tomb of Alfieri; the Graces Rising from the Bath; a Dancing Girl; a colossal Hector; a Paris, etc. After the second fall of Napoleon, in 1815, Canova was commissioned by the pope to demand the restoration of the works of art carried from Rome.

**Canovas del Castilio**, ANTONIO (1828-07), Spanish statesman. He became a journalist, in 1854 was elected to the Cortes and is still a member of that body. He held cabinet positions during Isabella's reign. He was instrumental in placing Alfonso XII on the throne in 1864. He was prime minister of Spain 1874-75, and from 1870 until August. 1897, when he was assassinated at Santa Agueda.

**Conrobert,** FRANCOIS-CERTAIN (1809-1895), marshal of France. He served many years in Africa, and was wounded in the siege of Constantine. He commanded a division in the Crimean War, after which he was promoted to commander in chief. He commanded a corps at Magenta and Solferino, and was made marshal of France and grand cross of the Legion of Honor. In the Franco-Prussian War his corps was cut to pieces by the crown prince of Prussia at Woerth, 1870. He was shut up in Metz with Bazaine, and after the surrender, was sent a prisoner to Germany. In 1876, and again in 1879, he was elected to the senate.

**Can'so**, GUT OR STRAIT OF, a narrow strait or channel, about 17 mi. long. separating Nova Scotia from Cape Breton Island. One of the Atlantic cables lands here.

**Cantab'rian Mountains,** the general name of the various mountain ranges extending from the Western Pyrenees along the n. coast of Spain to Cape Finisterre.

Cantal', a central department in France, area 2,217 sq. mi.; capital, Aurillac. This department, formerly part of Upper Auvergne, is named from its highest mountain, the Plomb du Cantal, 6,094 ft. in height. The principal crops are rye, buckwheat, potatoes, and chestnuts, hemp and flax. Cattle, sheep, pigs, horses and mules are reared in large numbers. Large quantities of cheese ("Auvergne cheese") are made. Hot mineral springs are abundant. Pop. 239,601.

**Cantalever**, a wooden or iron block framed into the wall of a house and projecting from it to carry moldings, eaves, balconies, etc. Also a large projecting framework forming part of an iron bridge directly carrying part of the roadway, and also supporting beams or girders bridging over a space between it and another similar structure.

**Can'taloupe** (-löp), a small round variety of muskmelon, globular, ribbed, of pale green or yellow color, and of delicate flavor; first grown in Europe at the castle of Cantaloupe.

in Europe at the castle of Cantaloupe. Can'terbury, a city of England in Kent, 55 mi. s.e. of London, giving name to an archiepiscopal see, the occupant of which is primate of all England. The Roman name was Durovernum, and the place was of early impor-tance. Its present name is a modification of the Saxon Cant-wara-byrig, the Kentishmen's city. The foundation of the archiepiscopal see took place soon after the arrival of St. Augustine in 596. In the eighth, ninth, tenth, and eleventh centuries the city was dreadfully ravaged by the Danes, but at the Conquest its buildings exceeded in extent those of London. The ecclesiastical importance of the place was consummated by the murder of Thomas & Becket in the cathedral, the priory and see benefiting by the offerings of devotees and pilgrims at his shrine. Henry VIII dis-solved the priory in 1539, and ordered the bones of Becket to be burned; and the troops of Oliver Cromwell made a stable of the cathedral. The cathedral, one of the finest ecclesiastical structures in England, 530 ft. in length and 154 in breadth, has been built in different ages, the oldest part dating from about 1174. The great tower, 235 ft. in height, is a splendid specimen of the Pointed style. The old archiepiscopal palace is now represented by a mere fragment, and the archbishops have long resided at Lambeth. There are extensive barracks for cavalry and infantry. Pop. 23.062.

**Canterbury**, a district occupying most of the center of South Island, New Zealand, with a coast line of 200 mi., and a greatest breadth of about 150 mi. The famous "Canterbury Plains." extending along the coast, are admirably adapted for agriculture, while the interior is fine pastoral country. though, except near the highlands, very destitute of trees. Its considerable mineral resources are as yet not well developed, though some coal—of which there are large beds—is raised. The chief places in the province are Christchurch, the capital; and Lyttelton, the port town, 8 mi. from Christchurch. Pop. 121,400.

**Canton**, Fulton co., 111., 30 mi. w. of Peoria. Railroads: C. B. & Q., and T. P. & W. Industries: two iron foundries, flour mill, eighteen

cigar factories, gun and bicycle factory, and a cigar box factory. The surrounding country is agricultural and mineral (coal). The town was first settled in 1822 and was blown away in June, 1835, became a city in 1854. Pop. est. 1897, 7,500.

Canton (Chinese, Quang-chow-foo), an important city of Southern China, in the province of Quang-tung (of which name Canton is a cor-ruption). The city proper is enclosed by walls and divided into two parts by a wall running east and west: the larger portion north of this wall being called the old, that on the south of it the new city. The foreign mercantile houses, and the British, French, and American consulates, have as their special quarter an area in the suburbs of the south west of the city, with water on two sides of it. In the European quarter are churches, schools, and other buildings in the European style. The river opposite the city for the space of four or five miles is crowded with boats, a large number of which -as many it is said as 40,000-are fixed residences, containing a population of 200,000. The industries of Canton are varied and important, embracing silk, cotton, porcelain, glass, paper, sugar, lacquered ware, ivory carving, metal goods, etc. It was the chief foreign emporium in China until 1850, when Shanghai began to surpass and other ports to compete with it; but its exports and imports together often still amount to about \$40,000,000. Since the establishment of the colony of Hong-Kong a flotilla of river steamers ply daily between Canton, Hong-Kong, and Macao. In 1856 the foreign factories were pillaged and destroyed by the Chinese, and about a year after this Canton was taken by an English force, and occupied by an English and French garrison until 1861. Pop. est. at over 1,600,000.

**Canton**, Stark co., O., 56 mi. s.e. of Cleveland. Railroads: Cleveland & Canton; Canton & Waynes; Valley; P., F. W. & C. Industries: Harvesting and threshing machines, flour mills, machinery, iron bridges, steel cutlery, safes, woolens, and soap. Surrounding country agricultural and mineral. It is the home of President McKinley. Pop. est. 1897, 30,000.

**Cantyre** (kan-tīr') (or Kintyre), a peninsula, Scotland, between the Firth of Clyde and the Atlantic, forming the southern division of Argyleshire.

Canute (or Cnut) (ka-nūt', knut) king of England and Denmark, succeeded his father Swegen or Sweyn on his death in England in 1014 A. D., and confirmed the Danish power in England. He began by devastating the eastern coast, and extended his ravages in the south. where, however, he failed to establish himself until after the assassination of Edmund Ironside, when he was accepted king of the whole of England (1017). Canute, who began his reign with barbarity and crime, afterward became a humane and wise monarch. He restored the English customs at a general assembly, and ensured to the Danes and English equal rights and equal protection of person and property, and even preferred English subjects to the most important posts. His power was confirmed by his marriage with Emma, Ethelred's widow. At Harold's death in 1018 he gained Denmark: in 1028 he conquered Norway; and in 1031 he made Malcolm of Scotland admit his superiority. Sweden also was vassal to him. He d. in 1036 at Shaftesbury, leaving Norway to his eldest son, Sweyn; to the second, Harold, England: to the third, Hardicanute, Denmark.

**Can'vas**, a coarse and strong cloth. made of flax or hemp, and used for sails, tents, etc. When prepared for portrait painting it is classed as *kit-cat*, 28 by 36 inches; *three quarters*, 25 by 30; *half-length*, 40 by 50; *bishop's half-length*, 44 or 45 by 56; *bishop's whole length*, 58 by 94.

• **Canvas-back Duck**, a bird peculiar to North America, and considered the finest of the waterfowl for the table. They arrive in the U. S. from the north about the middle of October, sometimes assembling in immense numbers. The plumage is black, white, chestnut-brown, and slate color; length, about 20 inches.

Caoutchouc (kö'chök or kou'chök), an elastic gummy substance, chemically a hydrocarbon, contained in the milky juice of a number of tropical trees of various orders, growing in South America. The name is also used as an equivalent of india rubber, but strictly caoutchouc is only the chief ingredient of india rubber. The crude india rubber is most commonly obtained by making incisions in the trunks of the trees, whence the sap exudes in the form of a milky fluid, which gradually thickens and solidifies. Caoutchouc is a non-conductor of electricity and a bad conductor of heat. It is not dissolved by water, hot or cold, but chloroform, oil of turpentine, bisulphide of carbon. etc., dissolve it. It was not until about the year 1736 that india rubber was known in Europe. It was at first only used to rub out pencil marks, but before the end of last century it was used to render leather and other substances water-tight, and in 1823 Mackintosh took out a patent for the waterproof materials prepared with caoutchouc which bear his name. To the American inventor, Goodyear, belongs the credit of discovering vulcanization and of making commercial use of india rubber. Latterly its uses have become innumerable. Guttapercha is a similar substance to caoutchouc. and is often popularly confounded with it. See India Rubber

**Cap**, a covering for the head, usually of softer materials and less definite form than a hat. Cap of maintenance, a cap formerly worn by dukes and commanders in token of excellency, now an ornament of state carried before the sovereigns of England at their coronation, and also before the mayors of some cities.

**Cape Breton**, an island of the Dominion of Canada, separated from Nova Scotia, to which province it belongs, by the narrow Gut or Strait of Canso; area 3,120 sq. mi. The surface is rather rugged and only small portions are suited for agriculture, but it possesses much timber, valuable minerals (several coa mines being worked), and the coast abounds in fish. Timber, fish, and coal are exported. The island belonged to France from 1632 to 1763, and Louisburg, its capital, was long an important military post. It was separate from Nova Scotia between 1784 and 1820. Chief town, Sydney. Pop. of Cape Breton, 34,244.

**Cape Coast Castle**, a town and fort in West Africa, capital of the British possessions on the Gold Coast. The fortress stands on a rock close to the sea; the town chiefly consists of mud huts, and is a mart for native barter. Climate unhealthy; principal exports, gold dust, ivory, and palm oil. Pop. 11,614. **Cape Cod**, a noted peninsula on the south side

**Cape Cod**, a noted peninsula on the south side of Massachusetts Bay in the state of Massachusetts, 65 mi. long and from 1 to 20 broad. It is mostly sandy and barren, but populous.

Cape Colony, a British colony occupying the southern extremity of Africa. Area 221,311 sq. mi.; pop. 1,527,224. Several ranges of mountains, running nearly parallel to the southern coast, divide the country into successive terraces, rising as they recede inland, between which lie belts of fertile land, or vast barren-looking plains, one of them, the Great Karroo, being 300 mi. long and 100 broad. These plains make valuable sheep-walks, and the soil, where there is a sufficiency of water, is generally fertile. Irrigation, however, is greatly required, and large reservoirs are now being constructed. The principal and furthest inland mountain terrace, averaging 6,000 or 7,000 ft. in height, commences in Namaqualand and runs to the northeast frontier. The culminating point is the Compass Berg, over 8,000 ft. The Table Mountain at Cape Town rises almost perpendicularly about 3,585 ft. in The colony is deficient in navigable height. rivers, and many of the streams are dry or al-most so in the warm weather. The climate is very healthy and generally pleasant. Except along the coast, especially the southeast coast district, where there are extensive forests, timber is scarce, but with irrigation trees can be grown anywhere. The quadrupeds of the colony comprise the African elephant, still found in the forests of the southeast coast region; buffalo, wild boar, zebra, quagga, leopard, hyena, numerous antelopes, baboon, armadillo, etc. The birds include vultures, eagles, the serpent-cater, pelicans, flamingoes, and, most important of all, the ostrich, now bred in farms for the sake of its feathers. The The princobra and other reptiles are found. cipal minerals are copper ore, coal, iron ore, manganese, and diamonds. amethysts, agates, etc. Coal and copper are worked, and the diamonds have brought a great amount of money into the colony since 1869, and have given rise to the town of Kimberley, the center of the diamond fields. Wheat, maize, and other cereals can be grown almost everywhere, if there is sufficient moisture, in some years All kinds yielding a surplus for exportation. of European vegetables, pot-herbs, and fruits thrive excellently, and fruits dried and pre-served are exported. The vine is cultivated, and excellent wines are made. Sheep-rearing,

especially that of pure merinoes, is the most important industry, and wool the chief export. Ostrich feathers, hides, and skins are also exported. Both native and Angora goats are bred, and the export of mohair is important. Cattle breeding is also carried on to some extent. There are as yet no manufactures of importance. The colony is intersected by 1,600 mi. of railway, far-inland Kimberley being now thus connected with Cape Town and Port Elizabeth. The European inhabitants consist in part of English and Scottish settlers and their descendants, but, not with-standing the recent influx of settlers from Britain, the majority are still probably of Dutch origin. The colored people are chiefly Hottentots, Kaffirs, Basutos, Griquas. Malays, and a mixed race. The laborers are chiefly Hottentots and Kaffirs. Responsible government has been possessed by the colony since 1872. The executive is vested in the governor (who is appointed by the crown and is also commander in chief) and an executive council of office-holders appointed by the crown. The legislative is in the hands of a council of twenty-two members (the Upper House); and a representative house of assembly of seventysix members (Lower House), elected for five After Cape Town the chief towns are vears. Port Elizabeth, Graham's Town, Kimberley, Stellenbosch, King William's Town, and Graaff Reinet. The Dutch first colonized the Cape in 1652, and till the end of the eighteenth century the colony was under the Dutch East India Company. It was held by the British from 1795-1801, and it came finally into British possession in 1806. The progress of the colony was long retarded by a series of Kaffir wars, the last of which was in 1851-53.

**Cape Elizabeth**, Cumberland co., Me., 14 mi. s. of Portland. Railroad, Boston & Maine. Principal industries include lead works, oil refineries, and rolling mills. Pop. est. 1897, 6,000.

**Cape Hat' teras, a** dangerous cape on the coast of North Carolina, the projecting point of a long reef of sand.

**Cape Hay'tien**, a town on the north coast of Hayti. It has an excellent harbor, but has declined in importance since the last century. Pop. about 16,000.

**Cape Horn** (or The Horn), the southern extremity of an island of the same name, forming the most southerly point of South America. It is a dark, precipitous headland, 500 to 600 ft. high, running far into the sea. Navigation round it is dangerous on account of frequent tempests. The cape was first doubled in 1616 by Schouten, a native of Hoorn, in Holland, whence its name.

**Cap'elin**, a small fish of the salmon family abundant on the banks of Newfoundland and used as bait for cod and also as food.

**Cape of Good Hope**, a promontory near the southern extremity of Africa, at the termination of a small peninsula extending south from Table Mountain which overlooks Cape Town. This peninsula forms the west side of False Bay, and on its inner coast is Simon's Bay and Simon's town, where there is a safe anchorage

and a British naval station. Bartholomew Diaz, who discovered the cape in 1487, called it Cape of Storms; but John II of Portugal changed this to its present designation. It was first doubled by Vasco da Gama in 1497.

**Caper**, the unopened flower bud of a low trailing shrub which grows from the crevices of rocks and walls, and among rubbish, in the countries bordering on the Mediterranean. Picked and pickled in vinegar and salt they are much used as a condiment (caper sauce being especially the accompaniment of broiled mutton). The plant was introduced into Britain as early as 1506, but has never been grown on a large scale. The flower buds of the marsh-marigold and nasturtium are frequently pickled and eaten as a substitute for capers.

<sup>•</sup> Capercail'zie (Capercail'lie, or Cock of the Wood), the wood grouse, the largest of the gallinaceous birds of Europe, weighing from 9 to 12 lbs. In the male the neck and head are ashy black, the wings and shoulders brown with



#### Capercailzie.

small black dots, the breast variable green, the belly black with white spots, the rump and flanks black with zigzag lines of an ashy color, and the tail feathers black, with small white spots near their extremities. The female, about one third less than the male, is striped and spotted with red or bay, black, and white, and has the feathers of the head, breast, and tail of a more or less ruddy hue. It is common in Northern Asia, in parts of Russia, and throughout Scandinavia. For some time it was almost or wholly extinct in Great Britain, but has been successfully reintroduced.

**Capernaum**, a town in ancient Palestine, on the west side of the Sea of Tiberias. Nothing of it now remains, but the site is identified with Tel Hum.

**Cape St. Vincent**, the southwest point of Portugal; noted for the naval victory gained off it by Sir John Jervis (afterward earl of St. Vincent) on Feb. 14, 1797.

Ca'pet, the name of the French race of kings which has given 118 sovereigns to Europe, viz., 36 kings of France, 22 kings of Portugal, 11 of Naples and Sicily, 5 of Spain, 3 of Hungary, 3 emperors of Constantinople, 3 kings of Navarre, 17 dukes of Burgundy, 12 dukes of Brittany, 2 dukes of Lorraine, and 4 dukes of Parma. The first of the Capets known in history was Robert the Strong, a Saxon, made count of Anjou by Charles the Bold, and afterward duke of the IIe de France. His descendant, Hugh, son of Hugh the Great, was in 987 clected king of France in place of the Carlovingians. On the failure of the direct line at the death of Charles IV the French throne was kept in the family by the accession of the indirect line of Valois, and in 1589 by that of Bourbon. Capet being thus regarded as the family name of the kings of France, Louis XVI was arraigned before the National Convention under the name of Louis Capet.

**Cape Town**, capital of the Cape Colony, South Africa, at the head of Table Bay, and at the base of Table Mountain, 30 mi. from the Cape of Good Hope. The port has a breakwater 2,000 ft. long, 2 docks 16 acres in area, and a large graving dock. Besides the railway going inland, a railway connects the town with Simon's Town on False Bay. Pop. 51,251; including suburbs, 83,718.

**Cape Verd**, the extreme west point of Africa, between the Senegal and the Gambia, discovered by Fernandez, 1445.

**Cape Verd Islands**, a group of ten or fifteen volcanic islands and rocks in the Atlantic, 320 mi. w. of Cape Verd (see above), belonging to Portugal. They produce rice, maize, coffee, tobacco, the sugar cane, physic nuts, and various fruits. Coffee, hides, archil, physic nuts, etc., are exported. Most of the inhabitants are negroes or of mixed race. The chief town is Praia, a seaport on São Thiago (Santiago), the largest island. Porto Grande, on São Vicente, is a coaling station for steamers. Pop. about 110,000.

**Cape Wrath**, the northwest extremity of Scotland, county Sutherland. It is a pyramid of gneiss bearing a lighthouse, the light of which is 400 ft. above sea level.



Capillaries.

a.- the artery; b.- the diameter of the bore, vein; c.-the interven- and that the surface of

**Cap'illaries**, in anatomy, the fine blood-vessels which form the links of connection between the extremities of the arteries and the beginnings of the veins.

Capillar' ity, the general name for certain phenomena exhibited by fluid surfaces when the vessels containing. the liquid are very narrow, and also exhibited by that portion of the fluid surface which is in close proximity to the sides of a larger vessel, or to any inserted object. Thus if an open tube of small bore be inserted in water, it will be noted that the liquid rises within it above its former level to a height varying inversely as the

## Capital

this column is more or less concave in form. The same phenomenon occurs in any fluid which will wet the tube; but in the case of a fluid like mercury, which does not wet the glass, the converse phenomenon appears, the liquid being depressed in the tube below its former level, and the portion within the tube exhibiting a convex surface. Similarly round the sides of the respective vessels, and round the outsides of the inserted tubes, we find in the first case an ascension, and in the second a depression of the liquid, with a corresponding concavity or convexity at its extreme edge. Two parallel plates immersed in the liquids give kindred results. As these phenomena occur equally in air and in vacuo they cannot be attributed to the action of the atmosphere, but depend upon molecular actions taking place between the particles of the liquid itself, and between the liquid and the solid, these actions being confined to a very thin layer forming the superficial boundary of the fluid. Every liquid, in fact, behaves as if a thin film in a state of tension formed its external layer: and although the theory that such tension really exists in the superficial layer must be regarded as a scientific fiction, yet it adequately represents the effects of the real cause, whatever that may be. Scientific calculations with respect to capillary depressions and elevations proceed, therefore, on the working theory that the superficial film at the free surface is to be regarded as pressing the liquid inward, or pulling it outward according as the surface is convex or concave-the convex or concave film being known as the meniscus (crescent). The part which capillarity plays among natural phenomena is a very varied one. By it the fluids circulate in the porous tissues of animal bodies: the sap rises in plants, and moisture is absorbed from air and soil by the foliage and roots. For the same reason a sponge or lump of sugar, or a piece of blotting paper soaks in moisture, the oil rises in the wick of a lamp, etc.

**Cap'ital**, in trade, the term applied, as the equivalent of "stock," to the money, or property convertible into money, used by a producer or trader for carrying on his business; in political economy, that portion of the produce of former labor which is reserved from consumption for employment in the further production of wealth - the apparatus of production. It is commonly divided under two main headscirculating capital and fixed capital. Circu lating capital comprises those forms of capital which require renewal after every use in production, being consumed (absorbed or transformed) in the single use, e. g., raw materials and wages Fixed capital, on the other hand, comprises every form of capital which is capable of use in a series of similar productive acts, e.g., machinery, tools, etc. From the ordinary economic point of view capital is conveniently limited to material objects directly employed in the reproduction of material wealth, but from the higher social point of view many things less immediately concerned in productive work may be regarded as capital. Thus Adam Smith includes in the fixed capital of a

## **Capital** Punishment

country, "the acquired and useful abilities of all the inhabitants;" and the wealth sunk in prisons, educational institutions, etc., plays ultimately a scarcely less important part in production than that invested in directly productive machinery.

**Capital**, an architectural term, usually restricted to the upper portion of a column, the part resting immediately on the shaft. In classic architecture each order has its distinctive capital, but in Egyptian, Indian, Saracenic, Norman, and Gothic they are much diversified.

Capital Punishment, in criminal law, the punishment by death. Formerly in Great Britain, as in many other countries, it was the ordinary form of punishment for felonies of all kinds; but a more accurate knowledge of the nature and remedies of crime, a more discriminating sense of degrees in criminality, and an increased regard for human life have latterly tended to restrict, if not to abolish, the em-ployment of the penalty of death. The improvement in the penal laws of Europe in this respect may be traced in large part to the publication of Beccaria's treatise on Crimes and Punishments in 1764. At that time in England, as Blackstone a year later pointed out with some amount of feeling, there were 160 capital offenses in the statute book. The work of practical reform was initiated in 1770 by Sir William Meredith, who moved for a committee of inquiry into the state of the criminal laws; but the modifications secured by it were few, owing to the opposition of the House of Lords, which continued down to 1832 to oppose systematically all attempts at criminal law reform. The publication of Madan's Thoughts on Executive Justice, in 1774, urging the stricter administration of the law as it then stood, brought out the opposition of Sir Samuel Romilly, who replied to it in 1785, and introduced at short intervals a series of bills for the abolition of the extreme sentence for minor offenses. The influence of Paley and Lord Ellenborough, and the reaction from the revolutionary principles, which prior to the reign of terror had inaugurated great penal changes in France, told strongly against his efforts; and even his Shoplifting act, to abolish the sentence of death in cases of theft to the value of five shillings, was resolutely rejected, though passed by the Commons in 1810, 1811, 1813, and 1816. Romilly's work was taken up by Sir James Mackintosh in 1820, and under Peel's ministry with greater success. At his death, however, in the year of the passage of the Reform bill (1832) forty kinds of forgery with many less serious offenses were still capital, though from that time the amelioration was rapid. In the five years following the Reform act, the capital offenses were reduced to 37, and subsequent changes left in 1861 only four capital charges -setting fire to H. M. dockyards or arsenals, piracy with violence, treason, and murder. At the present time the last of these may be regarded as the only capital crime; and the statement holds good for Scotland also, though robbery, rape, incest, and wilful fire raising are

## Capitanis

still capital crimes in Scottish common law. In several other European countries-Sweden, Denmark, North Germany, Bavaria, Austriathere is even a greater unwillingness to enforce capital punishment than is found in Great Britain, though the penalty remains upon the statute books. In Belgium there has been no execution since 1863. In Switzerland capital punishment was abolished in 1874, and though the right of restoring it was allowed to each canton in consequence of an increase of murders, only 7 out of a total of 22 have availed themselves of it. In Roumania it was abol-ished in 1864; in Holland in 1870; and it has also been discontinued in Portugal. In several of the states-Michigan, Wisconsin, Rhode Island, and Maine-imprisonment for life has been substituted for murder in the first degree: in the remainder capital punishment is retained, though the experiment of its abolition was made for a short time in New York and lowa.

The manner of inflicting the punishment of death has varied greatly. Barbarous nations are generally inclined to severe and vindictive punishments: and even in civilized countries, in cases of a political nature, or of very great atrocity, the punishment has been sometimes inflicted with many horrible accompaniments, such as tearing the criminal to pieces, starving him to death, breaking his limbs upon the wheel, pressing him to death in a slow and lingering manner, burning him at the stake, crucifixion, etc. In modern times among civilized nations, public opinion is strongly disposed to discountenance the punishment of death by any but simple means: and even in governments where torture is still counte-nanced by the laws it is rarely or never resorted to. In Great Britain and in most parts of the U. S. the method of execution is by hanging, except in the states of New York and Colorado, where electricity is employed. In Germany and France the sword and the guillotine are the usual means; in Spain, strangulation by means of the *garrole*, a sort of iron collar tightened by a screw. Since 1868 the law of England has required all executions to take place privately within the prison walls, and this system was adopted in 1877 by Ger-Capital punishment cannot be inmany. flicted, by the general humanity of the laws of modern nations, upon persons who are insane or who are pregnant, until the latter are delivered and the former become sane. In military law, sentence of death may be passed for various offenses, such as sedition, violence, and gross neglect of duty, desertion, assault upon superior officers, disobedience to lawful commands, etc.

**Capita** 'nis, the hereditary chieftains of certain bands of Christian warriors who, about the beginning of the sixteenth century, retired to the mountain fastnesses of Northern Greece, where they maintained a kind of independence of the Turkish government, and supported themselves by predatory incursions on the neighboring provinces. The Turks tried to organize them as a paid police, but with imperfect success: and in the struggle for Greek independence they not only formed an insurgent body of about 12,000 men, but furnished most of the Greek generals of that period—Odysseus, Karatasso, Marko Bozzaris, etc.

Capitol (now Campidoglio), the citadel of ancient Rome, standing on the Capitoline Hill, the smallest of the seven hills of Rome. It was planned by Tarquinius Priscus, but not completed till after the expulsion of the kings. At the time of the civil commotions under Sulla it was burned down, and rebuilt by the senate. It suffered the same fate twice afterward, and was restored by Vespasian and by Domitian, who instituted there the Capitoline games. The present capitol (Campidoglio), standing partly on the site of the old one, is a modern edifice, begun in 1536 after the design of Michael Angelo. It is used as a hotel de rille, museum, etc., contains some fine statues and paintings, and commands a superb view of the Campagna-the name of capitol is also given to the edifice in Washington where Congress assembles. The various separate states also call their statehouses capitols.

**Capo d'istria**, JOHN ANTHONY, COUNT (1776-1831), Greek statesman. In 1809 he entered the service of Russia and obtained an appointment in the department of foreign affairs. As imperial Russian plenipotentiary he subscribed the Treaty of Paris, Nov. 20, 1815. In 1828 he became president of the Greek Republic, in which office he was very unpopular, and he was assassinated by Constantine and George Mauromichalis.

**Cappado** cia, in antiquity, one of the most important provinces in Asia Minor, the greater part of which is included in the modern province of Karaman. Its boundaries varied greatly at different times. It was conquered by Cyrus, and was ruled by independent kings from the time of Alexander the Great until 17 A.D., when it became a Roman province. It was traversed by the river Halys, and among its chief towns were Comana, Ariarathia, and Tvana.

**Cappagh Brown** (kap'-ah), a bituminous earth, colored by oxide of manganese and iron, which yields pigments of various rich brown colors; called also manganese brown. It derives its name from Cappagh, near Cork, in Ireland.

**Capre'ra**, a small, rocky and infertile Italian island, on the northeast of Sardinia, and separated from it by a narrow strait. Area about 15 sq. mi. It was for many years the place of retirement of the Italian liberator Garibaldi, who died here in 1882.

**Capri** (ancient *Cuprčæ*), an island belonging to Italy, in the Gulf of Naples, 5 mi. long and 2 broad, rising to the height of about 1.900 ft., everywhere well cultivated. The inhabitants, amounting to 6,000, are occupied in the production of oil and wine, in fishing, and in catching quails at the seasons of their migrations. It contains the towns of Capri in the east, and Anacapri in the west, situated on the summit of a rock, and accessible by a stair of 522 steps. The emperor Tiberius spent here

# Capricornus

the last seven years of his life in degrading voluptuousness and infamous cruelty. The ruins of his palaces are still extant, and other ruins are scattered over the island. The island has several stalactitic caverns or grottoes in its steep rocky coast, which are famed for the wondrous colors reflected on the rocks, the Blue Grotto being the most famous. **Cap' ricornus** (Capricorn), a constellation of

**Cap**' ricornus (Capricorn), a constellation of the southern hemisphere, and one of the twelve signs of the zodiac, the one to which belongs the winter solstice, represented by the figure of a goat or a figure having the fore part like a goat and the hind part like a fish. Tropic of Capricorn. See Tropics.

**Cap' ridæ** (L. *caper*, a goat), the goat tribe, a family of ruminating animals, in which the horns are directed upward and backward, and have a bony core.

**Caprivi,** GENERAL VON (George Leo von Caprivi de Caprara de Monteculli), chancellor of the German Empire, was b. in 1831. He entered the Prussian army in 1849; served in the war of 1866 and the Franco-Prussian War, and in 1877 became major general. In December, 1882, he was given command of the third army division and from 1883 to 1888 was at the head of the admiralty. He held command of the tenth army corps, stationed in Hanover. In 1890 he became chancellor, in succession to Prince Bismarck.

**Cap'sicin**, an alkaloid, the active principle of the capsules of *Capsicum annuum*, or Guinea pepper. It has a resinous aspect and a burning taste.

**Cap'sicum**, a genus of annual, sub-shrubby plants, with a wheel-shaped corolla, projecting and converging stamens, and a many-



Capsicum.

seeded berry. They are chiefly natives of the East and West Indies, China, Brazil, and Egypt, but have spread to various other tropical or subtropical countries, being cultivated for their fruit, which in some reaches the size of an orange, is fleshy and variously colored, and contains a pungent principle (see *Capsicia*) which is present also and more largely in the seed. The fruit or pod is used for pickles,

## Capybara

sauces, etc., and also medicinally. Several of them yield Cayenne pepper, and the first (called often Guinea pepper, though originally a native of South America) also yields chillies.

**Caption**, in law, a certificate stating the time and place of executing a commission in chancery, or of taking a deposition, or of the finding of an indictment, and the court or authority before which such act was performed, and such other particulars as are necessary to render it legal and valid.

**Cap** ua, a fortified city of Italy, province Caserta, in a plain 18 mi. n. Naples, on the Volturno, which is crossed by a handsome bridge. It is the residence of an archbishop, and has a cathedral. Pop. 13,880. The ancient city was situated 34 mi. s.e. from the modern town. The site is now occupied by a small town, called Santa-Maria-di-Capua Veterc. The ancient Capua was of such extent as to be compared to Rome and Carthage. It was a favorite place of resort of the Romans on account of its agreeable situation and its healthy climate, and many existing ruins (including an amphitheater) attest its ancient splendor.

**Capuchin Monkey** (kap-u-shēn'), a name given to various species of South American monkeys of the genus *Cebus*. The hair of their heads is so arranged that it has the appearance of a capuchin's cowl. hence the name. The name is most frequently given to the Sai, the Horned Sapajou, as well as to a monkey belonging to an allied species.

**Capuchins** (kap-u-shēnz'), monks of the order of St. Francis, so called from the *capuchon* or *capuce*, a stuff cap or cowl, the distinguishing badge of the order. They are clothed in brown or gray, go barefooted, and never shave their beard.

**Capyba'ra**, a species of rodent, sometimes known by the name of the water hog, and of the family Cavidæ (guinea pig). It attains the length of about 3 ft., and has a very large and thick head, a thick body covered with short,



coarse, brown hair, and short legs, with long feet, which, being in a manner webbed, fit it for an aquatic life. It has no tail. It is common in several parts of South America, and particularly in Brazil. It feeds on vegetables and fish, which it catches somewhat in the manner of the otter.

## Carbobo.

**Carbo' bo,** a state of Venezuela, washed on the n. by the Caribbean Sea. Area about 2,984 sq. mi.; pop. 167,499. The capital is Valencia, the chief port Puerto Cabello.

**Car'acal**, a species of lynx; a native of Northern Africa and Southwestern Asia. It is about the size of a fox, and mostly of a deep-



brown color, having tufts of long black hair which terminate the ears. It possesses great strength and flerceness.

**Caracal ia**, MARCUS AURELIUS ANTONINUS, eldest son of the Emperor Severus (188-217). On the death of his father he succeeded to the throne with his brother Antoninus Geta, whom he speedily murdered. To effect his own security upward of 20,000 other victims were butchered. He was himself assassinated by Macrinus, the prætorian prefect, who succeeded him.

**Carac'as**, a city of South America, capital of Venezuela, situated in a fine valley, about 3,000 ft. above the Caribbean Sea, connected by railway with the port La Guayra, about 10 mi. distant. It is regularly laid out, and has some good buildings, including a cathedral, university, federal palace, and other government buildings, etc. It has various parks and gardens, gas and water supply, telephones, tramways, etc. In 1812 it was in great part destroyed by an earthquake, and nearly 12,000 persons buried in the ruins. Pop. 55.638.

persons buried in the ruins. Pop. 55,638. **Caraccioli** (ká-råch'o-lē), FRANCESCO (1748-1799), Italian admiral. In 1798 he entered the service of the Parthenopean Republic, and repelled, with a few vessels, an attempt of the Sicilian-English fleet to effect alanding. When Ruffo took Naples in 1799 Caraccioli was arrested, and, contrary to the terms of capitulation, was condemned to death, and hanged at the yard arm of a Neapolitan frigate, Lord Nelson consenting to his execution.

**Car'adoc** (or Carac'tacus), a king of the ancient British people called Silures, inhabiting South Wales. He defended his country with great perseverance against the Romans, but was at last defeated, and led in triumph to Rome, A.D. 51, after the war. His noble bearing and pathetic speech before the Emperor Claudius procured his pardon, but he and his relatives appear to have remained in Italy. **Caram'bola**, the fruit of an East Indian tree. It is of the size and shape of a duck's egg, of an agreeable acidulous flavor, used in making sherbets, tarts, and preserves.

**Car' amel**, the brown mass which cane sugar becomes at 220° C., used in cooking as a coloring and flavoring ingredient, in giving a brown color to spirits, etc. The name of a certain preparation of candy.

**Car'at**, a weight of 3.17 troy grains, used by jewelers in weighing precious stones and pearls. The term is also used to express the proportionate fineness of gold. The whole mass of gold is divided into twenty-four equal parts, and it is called gold of so many carats as it contains twenty-four parts of pure metal. Thus if a mass contains twenty-two parts of pure gold out of every twenty-four it is gold of twenty-two carats.

**Carau'sius, a** Roman general, a native of Batavia. He was sent by the Emperor Maximian to defend the Atlantic coasts against the Franks and Saxons; but foreseeing impending disgrace, he landed in Britain and got himself proclaimed emperor by his legions (287 A. D.). In this province he was able to maintain himself six years, when he was assassinated at York by one of his officers named Allectus (293 A.D.).

**Caravaggio** (ki-rá-våj'ö), a town of Northern Italy, prov. of Bergamo, 24 mi. e. of Milan, on the Gera d'Adda. It is celebrated as the birthplace of the two great painters, Polidoro Caldara and Michael Angelo Merighi, both called *Cararaggio*. Pop. 6,089. **Car'avan**, a Persian word used to denote

**Car'avan**, a Persian word used to denote large companies which travel together in Asia and Africa for the sake of security from robbers, having in view, principally, trade or pilgrimages. In Mohammedan countries caravans of pilgrims are annually formed to make the journey to Mecca. The most important are those which annually set out from Damascus and Cairo. Camels are used as a means of conveyance on account of their remarkable powers of endurance.

**Car'avel**, the name of different kinds of vessels, particularly a small ship used by the Spaniards and Portuguese in the fifteenth and sixteenth centuries for long voyages. It was narrow at the poop, wide at the bow, and carried a double tower at its stern and a single one at its bows. It had four masts and a bowsprit, and the principal sails were lateen sails. It was in command of three such caravels that Columbus crossed the Atlantic and discovered America.

**Caravel' las**, a seaport of Brazil, prov. Bahia, the principal port of the surrounding country, and the headquarters of the Abrolhos Islands whale fishery. Pop. about 4,000.

**Car'away**, a biennial plant, with a tapering fleshy root, a striated, furrowed stem, and white or pinkish flowers. It produces a wellknown seed used in confectionery, and from which both a carminative oil is extracted and the liquor called kümmel prepared.

**Carbazot' ic Acid**, a crystallizable acid and bitter substance obtained by the action of ni-

## Carbohydrate

tric acid on indigo and some other animal and vegetable substances. It is of great importance in dyeing. When silk which has been treated with a mordant of alum or cream of tartar, is immersed in a solution of this acid, it is dyed of a beautiful permanent yellow color. Often called *Pieric Acid*.

**Carbohy** '**drate**, an organic compound containing carbon and the elements of water, as starch and cellulose.

Carbol' ic Acid, an acid obtained from coaltar. It is, when pure, a colorless crystalline substance, but it is usually found as an oily liquid, colorless, with a burning taste and the odor of creosote. Carbolic acid is now much employed as a therapeutic and disinfectant. It may be taken internally in cases in which creosote is indicated; but its principal use in medicine is an external application to unhealthy sores, compound fractures, and to abscesses after they have been opened, over which it coagulates, forming a crust impermeable to air and to the organic germs floating in the atmosphere, which produce decomposi-tion in the wound. The action of the acid is not only to exclude these germs but also to destroy such as may have been admitted, for which reason it is introduced into the interior of the wound. Called also Phenic Acid and Phenol.

Carbon, one of the elements, existing uncombined in three forms, charcoal, graphite, or plumbago, and the diamond; chemical symbol C, atomic weight 12. The diamond is the purest form of carbon; in the different varieties of charcoal, in coal, anthracite, etc., it is more or less mixed with other substances. Pure charcoal is a black, brittle, light, and inodorous substance. It is usually the remains of some vegetable body from which all the volatile matter has been expelled by heat; but it may be obtained from most organic matters. animal as well as vegetable, by ignition in close vessels. Carbon being one of those elements which exist in various distinct forms is an example of what is called allotropy. The compounds of this element are more numerous than those of all the other elements taken together. With hydrogen especially it forms a very large number of compounds, called hydrocarbons, which are possessed of the most diverse properties, chemical and physical. With oxygen, again, carbon forms only two compounds, but union between the two elements is easily effected. It is one of the regular and most characteristic constituents of both animals and plants. See Diamond, Charcoal, Graphite, Bone Black, Carbonic Acid, Coke,

**Carbona' ri** (lit. charcoal burners), the name of an Italian political secret society, which appears to have been formed by the Neapolitan republicans during the reign of Joachim (Murat), and had for its object the expulsion of the strangers and the establishment of a democratic government.

**Car'bonates**, compounds formed by the union of carbonic acid with a base, as the carbonate of lime, the carbonate of copper, etc. Carbonates are an important class of salts, many of them being extensively used in the arts and in medicine.

**Car' bondale**, Lackawanna co., Pa., on Lackawanna River, 16 mi. n.e. of Scranton. Railroads: Delaware Hudson; Erie & New York; and Ontario & Western. Industries: Refrigerator factory, three flouring mills, two iron foundries, silk mill, and several other factories. Elk Mountain, two miles distant, is the second highest point in Pennsylvania. The town was first settled in 1826, and became a city in 1850. Pop. est. 1897, 18,000.

Carbon' ic Acid, more properly called Carbonic Anhydride, or Carbon Dioxide, a gaseous compound of 12 parts by weight of carbon and 32 of oxygen, colorless, without smell, twentytwo times as heavy as hydrogen, turning blue litmus slightly red, and existing in the atmosphere to the extent of 1 volume in 2,500. It is incapable of supporting combustion or animal life, acting as a narcotic poison when present in the air to the extent of only 4 or 5 per cent. It is disengaged from fermenting liquors and from decomposing vegetable and animal substances, and is largely evolved from fissures in the earth, constituting the choke damp of mines. From its weight it has a tendency to subside into low places, vaults, and wells, rendering some low-lying places, as the upas valley of Java, and many caves, uninhabitable. It has a pleasant, acidulous, pungent taste, and aerated beverages of all kindsbeer, champagne, and carbonated mineral water-owe their refreshing qualities to its presence, for though poisonous when taken into the lungs, it is agreeable when taken into the stomach. This acid is formed and given out during the respiration of animals, and in all ordinary combustions, from the oxidation of carbon in the fuel. It exists in large quantities in all limestones and marbles. It is evolved from the colored parts of the flowers of plants both by night and day, and from the green parts of plants during the night. During the day, plants absorb it from the atmosphere through their leaves, and it forms an important part of their nourishment.

**Carbonic Oxide**, a substance obtained by transmitting carbonic acid over red-hot fragments of charcoal, contained iu a tube of iron or porcelain, and also by several other processes. It is a colorless, inodorous gas, sp. gr. 0.9727, has neither acid nor alkaline properties, is very poisonous, and burns with a pale lavender flame.

**Carbonif** erous System, in geology, the great group of strata which lie between the Old Red Sandstone below and the Permian or Dyas formation above, named from the quantities of coal, shale, and other carbonaceous matter contained in them. They include the coal measures, millstone grit, and mountain limestone, the first being uppermost and containing the chief coal fields that are worked. Iron ore, limestone, clay, and building stone are also yielded abundantly by the carboniferous strata which are found in many parts of the world, often covering large areas. See

Coal. The thickness of the coal measures in South Wales has been estimated at 10,000 to 13,000 ft. As coal consists essentially of metamorphosed vegetable matter, fossil plants are very numerous in the carboniferous rocks, more than 1,500 species of them having been named, a large proportion of which are ferns, tree lycopods, and large horsetail-like plants. The animals include insects, scorpions, amphibians, numerous corals, crinoids, molluscs, cephalopods, sharks, and other fishes.

**Carbon Points,** in electric lighting, two pieces of very hard, compact carbon, between which the electric current is broken, so that the resistance which they offer to the passage of the current produces a light of extraordinary brilliancy.

**Carbun'cle**, a beautiful gem of a deep red color with a mixture of scarlet, found in the East Indies. When held up to the sun it loses its deep tinge, and becomes exactly of the color of a burning coal. The carbuncle of the ancients is supposed to have been a garnet.

Car'bureted Hydrogen, the name given to two compounds of carbon and hydrogen, one known as *light carbureted hydrogen*, and the other as *olefiant gas*. The former is the compound, which occurs in coal mines (fire damp) and about the neighborhood of stagnant pools. Mixed with atmospheric air from seven to fourteen times that of the gas it explodes. The latter is obtained from distilling coal or fat substances in close vessels. It explodes when mixed with ten or twelve volumes of atmospheric air.

**Carcassonne**, capital of the dep. Aude, France. The old town is surrounded by a double wall, part of it so ancient as to be attributed to the Visigoths. The new town is regularly built, and has many handsome modern houses. The staple manufacture is woolen cloth. Pop. 27,512.

**Card**, an instrument for combing, opening, and breaking wool, flax, etc., freeing it from the coarser parts and from extraneous matter. It is made by inserting bent teeth of wire in a thick piece of leather, and nailing this to a piece of oblong board to which a handle is attached. But wool and cotton are now generally carded in mills by teeth fixed on a wheel moved by machinery. The word is derived through the French carde, a teasel, from L. carduus, a thistle, teasels having been used for cards.

**Car' damoms,** the aromatic capsules of different species of plants, employed in medicine as well as an ingredient in sauces and curries. The cardamoms known in the shops are the large, supposed to be produced by a Madagascar plant; the middle sized and the small, both supposed to be the produce of a native of Sumatra and other Eastern islands. Those recognized in the American pharmacopœia, called *true* or officinal cardamoms and known in commerce as Malabar cardamoms, are the produce of a native of the mountains of Malabar and Canara.

**Cardan** (or CARDA'NO GERONIMO) (1501-1576). Italian philosopher, physician, and mathematician. He acquired extraordinary repu-

tation as a physician, and was invited to Scotland to attend Archbishop Hamilton of St. Andrews, who had been sick for ten years, and who was restored to health by his prescriptions. He made some important discoveries in algebra, studied astrology, pretended to a gift of prophecy, and wrote a large number of books.

**Card'board**, a kind of stiff paper or pasteboard for cards, etc., usually made by sticking together several sheets of paper. **Carde'nas**, a seaport on the north coast of

**Carde'nas**, a seaport on the north coast of Cuba, 103 mi. e. of Havana, with which it is connected by rail. One of the principal commercial centers of the island; chief exports: sugar, molasses, and coffee. Pop. 12,010.

sugar, molasses, and coffee. Pop. 12,910. **Car'diff** ("the city on the Taff"), seaport, the county town of Glamorganshire, Wales, situated at the mouth of the Taff on the estuary of the Severn. It is a rapidly increasing town, and the principal outlet for the mineral produce and manufactures of South Wales. Iron shipbuilding is carried on, and there are iron and other works on a large scale. The docks are extensive and well constructed (total area about 200 acres), and various improvements to the port have been carried out. It is the chief coal port of England. Pop. 128,849.

**Car' digan**, the county town of Cardiganshire, South Wales, on the river Teif, about 3 mi. from its mouth in Cardigan Bay. Pop. 3,447. The county of Cardigan has an area of 443,387 acres, of which two thirds is under crop or pasture. The surface of the northern and eastern parts is mountainous, but interspersed with fertile valleys; while the southern and western districts are more level and produce abundance of corn. It is rich in mevalliferous lodes, the lead mines still yielding largely. The principal town is Aberystwith. Pop. 62,596.

Cardinal Bird, a North American bird of the



Cardinal Finch.

fluch family, with a fine red plumage, and a crest on the head. Its song resembles that of

the nightingale, hence one of its common names, Virginian Nightingale. In size it is about equal to the starling. Called also Scarlet Groebeak or Cardinal Groebeak and Red Bird.

**Cardinal Flower**, the name commonly given to *Lobēlia cardinālus*, because of its large, very showy, and intensely red flowers; it is a native of North America, but is much cultivated in gardens in Britain.

**Carding,** the process wool, cotton, flax, etc., undergo previous to spinning, to lay the fibers all in one direction, and remove all foreign substances. See *Card*.

**Ca**'ret (L., "there is something wanting"), in writing, a mark made thus.  $\wedge$ , which shows that something, omitted in the line, is interlined above or inserted in the margin, and should be read in that place.

**Ca'rey**, HENRY (1690-1743), a British composer, dramatist, and poet. He composed the words and music of many popular songs, including Sally in Our Alley, God Save the King, etc. He also wrote farces and other works. **Carey**, HENRY CHARLES (1793-1870), political

**Carey**, HENRY CHARLES (1703-1879), political economist, b. in Philadelphia. His father, Matthew Carey, was a publisher and political economist. He gave his son a liberal education, and at the age of eight the boy entered his father's bookstore. He was successful in business, and made a study of economic questions. He was a member of the Republican party from its formation, supported the Union during the Civil War, was a trusted adviser of Lincoln and Chase, and was a member of the constitutional convention of Pennsylvania, in 1872. At his death he gave his valuable library to the University of Pennsylvania. He advocated a new system of political economy, and wrote extensively on protection and the currency.

**Ca'ria**, an ancient country forming the s.w. corner of Asia Minor, and partly settled in early times by Greek colonists chiefly of the Dorian race. About B. c. 120 it was incorporated in the Roman province of Asia. Cnidus, Halicarnassus, and Miletus were among the chief towns.

**Caria'co,** a seaport town, Venezuela, situated to the east of the Gulf of Cariaco. near the mouth of a river of the same name. Pop. 7,000. The Gulf of Cariaco is 38 mi. long, from 5 to 10 broad, from 80 to 100 fathoms deep, surrounded by lofty mountains.

**Caribbe an Sea**, that portion of the North Atlantic Ocean lying between the coasts of Central and South America, and the West India Islands. It communicates with the Gulf of Mexico by the Yucatan channel.

**Car' ibbee Bark**, the bark of a tree growing in the West Indies, closely allied to Cinchona, and occasionally substituted for the true species of the latter. It is called also *St. Lucia Bark*.

**Car' iboo** (Caribou), the name of two American species of reindeer, sometimes regarded as specifically identical with the Old World reindeer. The woodland cariboo most nearly resembles the common reindeer. It is found over considerable tracts of Canada, as also in Newfoundland and Labrador, and is migratory in its habits. The Barren Ground cariboo is much smaller, but has larger horns. It executes considerable migrations, going north to the Arctic Ocean in summer, and returning in autumn.

**Car'ibs,** the original inhabitants of the West Indian Islands, and, when Europeans became acquainted with America, also found in certain portions of Central America and the north of South America. At present only a few remain on Trinidad, Dominico, and St. Vincent.

**Car'icature**, a representation of the qualities and peculiarities of an object, but in such a way that beauties are concealed and peculiarities or defects exaggerated, so as to make the person or thing ridiculous, while a general likeness is retained. Though a degenerate, it is one of the oldest forms of art. Egyptian art has numerous specimens of caricature, and it has an important place in Greek and Roman art. It flourished in every European nation during the Middle Ages, and in the present day it is the chief feature in the socalled comic journals.

**Carimat'a**, an island about 50 mi. from the coast of Borneo. It is about 10 mi long and rises to a height of 2,000 ft. It is visited by Malays, who collect tortoise-shell, tripang, and edible birds' nests.

**Carinth'ia**, a province of Austria; area 4,006 sq. mi. The iron, lead, and calamine mines are the main sources of its wealth, though there are several manufactories of woolens, cottons, silk stuffs, etc., most of which are in Klagenfurt, the capital. Pop. 348,730.

**Car'isbrooke**, a village of the Isle of Wight, England. In its ancient castle Charles I was imprisoned thirteen months previous to his execution.

**Carleton,** WILL, American author, was b. in Hudson, Mich., Oct. 21, 1845. He graduated at Hillsdale College in that state; and soon after completing his studenthood, he began to lecture in various parts of the U. S. and Canada. He has more than once visited Europe. His best known works are ballads of domestic life. His fresh and striking *Farm Ballads* (1873), *Farm Legends* (1875), *Farm Festicals* (1881), *City Ballads* (1885), and other poems, possess both vigor and pathos, and have attained a wide popularity on both sides of the Atlantic.

**Carleton, WILLIAM (1798-1869), Irish novelist.** His education commenced at a hedge school, and terminated with two years' training in an academy. Thence he went to Dublin to try his fortune in the walks of literature. There, in 1830-32, were published his *Traits and Stories of the Irish Peasantry*. He published several other popular novels. He enjoyed a government allowance of \$1,000 per annum several years before his death. Barnett-Smith calls him "one of the truest, the most powerful, and the tenderest delineators of Irish life."

**Carlisie**, a town of England, county town of Cumberland. Sacked by the Danes and re-

built by William Rufus. It was held by the Scots during their tenure of Cumberland, and the church of St. Mary's was founded by David I, who d. here. During the border wars Carlisle underwent many sleges. It surrendered to Charles Edward in 1745. The cathedral, begun in the reign of William Rufus, was partly destroyed by Cromwell in 1648. In the various improvements of the city all the walls, gates, and fortifications have been removed, except a portion of the west wall, and the castle. Carlisle is the seat of various manufactures, of which cotton is the principal. Pop. 39, 176.

39,176. Carlisle, Cumberland co., Pa., on Conodoguinet River, 18 mi. w. of Harrisburg. Railroads: Cumberland Valley, and Philadelphia & Reading. Industries: iron foundry, flour mill, three shoe factories, two silk mills, axle works, ice and lumber and wrapper factories, etc. It is the seat of Dickinson Methodist College, founded in 1873, and of Carlisle school for the education of Indian pupils. Pop. est. 1897, 11,000.

**Carlisle**, JOHN GRIFFIN, American statesman. b. in Kentucky, Sept. 5, 1835. He became a lawyer and served several terms in the state legislature. He was state senator, 1866-71. From 1871 to 1875 he was lieutenant governor of the state, and in 1877 took his seat in Congress. From 1883 to 1889 he served as speaker of the House of Representatives. In 1800 he was elected senator to succeed Mr. Beck. He was secretary of the treasury in President Cleveland's second administration.

**Carlos'**, DON (1545-1568), Infant of Spain, son of Philip II. He was deformed in person, of a vindictive disposition. He was presumably murdered, but of this there is no proof. The story of Don Carlos has furnished the subject of several tragedies.

**Carlos de Bourbon**, DON MARIA ISIDOR (1788– 1855), the second son of Charles IV of Spain. His eldest son, Don Carlos, excited insurrections in his favor in his native country, but these attempts were always frustrated. His nephew, Don Carlos, duke of Modena, b. 1848, is the present representative of the Carlists. In 1873 he instigated a rising in the north of Spain, and continued the struggle till after Alfonso XII came to the throne, when he was defeated and withdrew.

**Carlotta**, ex-empress of Mexico, daughter of Leopold I, first king of the Belgians, was b. July 7, 1840. In 1857 she became the wife of the Archduke Maximilian of Austria, who afterward usurped the throne of Mexico. The execution of her husband preyed on her mind, and for many years she was under restraint.

**Carlovin'gians**, the second dynasty of the French or Frankish kings, which supplanted the Merovingians, deriving the name from Charles Martel or his grandson Charlemagne. Charles Martel (715-741) and his son Pepin (741-768) were succeeded by Charlemagne and his brother Carloman (768-771). Charlemagne became sole king in 771, and was succeeded in the Empire of the West by his son Louis le Debonnaire, 814. He divided his empire among his sons, and at his death (840) his son Charles the Bald became king of France. He died in 877, and was succeeded by a number of feeble princes. The dynasty came to an end with Louis V, who d. in 987.

**Car'low**, an inland county of Ireland, province of Leinster. Area 346 sq. mi. From the remarkable fertility of its soil it is altogether an agricultural county, producing a great deal for exportation. Pop. 40,936. Carlow, the county town, is 34 mi. s.w. of Dublin. It is the principal mart for the agricultural produce of the surrounding country. There is a Roman Catholic cathedral and divinity college. On rising ground stand the ruins of the ancient castle of Carlow. Pop. 6,619.

**Carlowitz** (kår'lo-vits), a town of Austrian Slavonia, 7 mi. s.e. Peterwardein; the center of a famous wine-growing district. A peace was concluded here in 1600 between Austria, Russia, and Poland, and the Turks. Pop. 5,800.

**Carlsbad** (kårls' båt) ("Charles's Bath"), a town of Bohemia, famous for its hot mineral springs, and much frequented by visitors from all parts of the world, being useful in diabetes, gout, etc. Pop. about 11,000.

gout, etc. Pop. about 11,000. **Carlscro na** ("Charles's Crown"), a fortified seaport of Sweden, capital of the province of Blekinge or Carlscrona. It is the chief Swedish naval station, the harbor being safe and spacious, with fine dock, shipyards, arsenal, etc. It has a considerable export trade in timber, tar, potash, tallow, etc. Pop. 19,497.

**Carisruhe** (kārls'rö) ("Charles's Rest"), the capital of the Grand-duchy of Baden, Germany. The castle of the grand duke stands as a center, and from this point a number of streets radiate at regular distances, thus forming a kind of fan. The court library contains 100,000 volumes; there are also a large public library, several valuable museums and art collections, a botanic garden, polytechnic school, etc. Pop. 61,074.

Caristadt (karl'stat), ANDREAS RUDOLF BOD-ENSTEIN (1480-1541), a German reformer. About 1517 he became one of Luther's warmest supporters. He was excommunicated by the bull against Luther, and was the first to appeal from the pope to a general council. While Luther was at the Wartburg, Carlstadt instigated the people and students to the destruction of the altars and the images of the saints. In 1524 he declared himself the opponent of Luther, and commenced the controversy respecting the sacrament, denying the bodily presence of Christ in the sacramental elements. This controversy ended in the separation of the Calvinists and Lutherans. After many misfortunes he settled as vicar and professor of theology at Basel, where he d.

**Carlyle,** THOMAS (1795-1881), one of the greatest English writers of the present century, b. at Ecclefechan, Dumfriesshire. He was the eldest son of James Carlyle, a mason, afterward a farmer, and was intended for the church, with which object he was carefully educated. In his fitteenth year he was sent to

## Carmagnole

the University of Edinburgh, where he developed a strong taste for mathematics. Having renounced the idea of becoming a minister, after finishing his curriculum he became a after finishing his curriculum ne became a teacher for about four years. In 1818 he re-moved to Edinburgh, where he supported him-self by literary work. His career as an author may be said to have begun with the issue in monthly portions of his *Life of Schiller* in the London *Magazine*, in 1823, this work being enlarged and published separately in 1825. In 1824 he published a translation of Legendre's Geometry, with an essay on proportion by him-self prefixed. The same year appeared his translation of Goethe's Wilhelm Meister's Apprenticeship. He was next engaged in translating specimens of the German Romance writers, published in 4 vols. in 1827. In 1827 he married Miss Jane Bailie Welsh, a lineal descend-ant of John Knox. After his marriage he resided for a time in Edinburgh, and then withdrew to Craigenputtock. Here he wrote a number of critical and biographical articles for various periodicals, and here was written Sartor Resartus, the most original of his works. The publication of Sartor soon made Carlyle famous. On his removal to London he fixed his abode at Cheyne Row, Chelsea, where his life henceforth was mainly spent. His next work of importance was on the French Revolution. He delivered several series of lectures, the most important of these, on *Heroes and Hero-worship*, being published in 1840. Char-tism, published in 1839, and Past and Present, in 1843, were small works bearing on the af-fairs of the time. In 1845 appeared his Oliver Cromuell's Letters, and Speeches, with Elucidations. In 1850 came out his Latter-day Pamphlets. He next wrote a life of his friend John Sterling, published in 1851. The largest and most laborious work of his life, *The History of Frederick II* of Prussia, called Frederick the Great, next appeared, the first two volumes in 1858, the second two in 1862, and the last two in 1865, and after this time little came from his pen. In 1866, having been elected lord rector of Edinburgh University, he delivered an installation address to the students on the While still in Scotland the Choice of Books. sad news reached him that his wife had died Mrs. Carlyle, besides suddenly in London. being a woman of exceptional intellect. was a most devoted and affectionate wife. He left the estate of Craigenputtock to the University of Edinburgh, stipulating that the income from it should form ten bursaries to be annually competed for-five for proficiency in mathematics and five for classics (including English).

**Carmagnole** (kår-må-nyöl), a name applied in the early times of the French Republic (1792-93) to a highly popular song, and a dance by which it was accompanied.

**Carmar' then** (or Carmar' then), a maritime county, South Wales. It is of a mountainous character generally, and its valleys are noted for the beauty of their scenery. The mineral products of the county are iron, lead, coal, and limestone. The chief towns are Carmarthen and Llanelly. Pop. 130,574. Car-

## Carnegle

marthen, the county town, is situated 9 mi. from the sea, on the Towy. The salmon fishery is extensive. Pop. 10,338.

**Carmel**, a range of hills in Palestine, extending from the Plain of Esdraelon to the Mediterranean. It has a length of about 16 mi., and its highest point is 1,850 ft. above the sea.

**Car' melites,** mendicant friars of the order of Our Lady of Mount Carmel. From probably the fourth century holy men took up their abode as hermits on Mount Carmel in Syria.

**Car' minatives,** medicines obtained chiefly from the vegetable kingdom, and used as remedies for flatulence and spasmodic pains.

**Car'mine**, the fine red coloring matter or principle of cochineal, from which it is prepared in several ways, the result being the precipitation of the carmine. It is used to some extent in dyeing, in water-color painting, to color artificial flowers, confectionery. etc.

**Carnac**, a village of Brittany, France. dep. of Morbihan, on a height near the coast, 15 mi. s.e. of Lorient, and remarkable for the socalled Druidical monuments in its vicinity.

**Carnar' von** (or Caernarvon), a maritime county of North Wales; area 369,477 acres. 11 is traversed by lofty mountains, including the Snowdon range, whose highest peak is 3,571 ft., and the highest mountain in South Britain. Slate is the chief mineral, large quantities of which are exported. Pop. 118,225. CARNARvon, the county town, is a seaport on the southeast side of the Menai Strait. The old part of the town is surrounded by an ancient wall. Pop. 9,804.

**Carnat'ic,** the district in Southeastern India extending from Cape Comorin to the northern Circars, lying east of the Ghats, and reaching to the sea on the Coromandel coast.

**Carnation**, the popular name of varieties of the clove pink. The carnations of the florists are much prized for the beautiful colors of their sweet-scented double flowers. They are arranged into three classes according to color, viz., bizarres, flakes, and picotees.

**Carnegie**, ANDREW, an American millionaire, was b. at Dunfermline, Scotland, 1835, whence his father, a hand-loom weaver, emigrated to America. The family settled in Pittsburgh, where Andrew obtained employment first as a telegraph messenger. A fortunate acquaintance with the sleeping-car patentee laid the foundation of his success: then came lucky ventures in oil and the starting of a rolling mill from which has grown the largest system of iron and steel industries in the world.

**Carnegie**, Alleghany co., Pa., on Chartier's Creek, 30 mi. from Pittsburg. Railroads: Pan Handle; Chartier's Valley; and P. C. & Y. Industries: iron and steel mills and other manufactories. Coal, oil, and natural gas to be found in large quantities. First settled in 1842 by Col. M. B. Brown, and the name was changed from Mansfield Valley to Carnegie in 1894. Carnegie has two weekly papers. Pop. est. 1807, 9,000.

**Carnio la**, province of Austria: area 3,856 sq. mi. There are iron, lead, and quicksilver mines, and abundance of coal, marble, and valuable stone. Pop. 498,958. The capital is Laibach.

**Carnival**, the feast or season of rejoicing before Lent, observed in Catholic countries with much revely and merriment.

Carnivora, a term applicable to any creatures that feed on flesh or animal substances, but now applied specially to an order of mammals which prey upon other animals. The head is small, and the jaws powerful. Two sets of teeth, deciduous or milk and permanent, are always developed in succession, and in both sets incisors, canines, and molars are distinguishable. The stomach is simple and the alimentary canal short. Carnivora are often divided into Plantigrada, comprising the bears, badgers, raccoons, etc.; Digitigrada, comprising lions, tigers, cats, dogs; and Pin-nipedia or Pinnigrada, comprising the seals and walruses. The two former divisions are also classed together as Fissipedia. The Plantigrada are also decidedly carnivorous. In the Pinnigrada the body is long and of a fish shape, the fore and hind limbs are short and expanded into broad webbed swimming paddles.

Carnot, LAZARE NICOLAS MARGUERITE (1753-1823), a French statesman, general, and strate-gist. When the revolution broke up he was captain in the corps of engineers. In 1791 he was sent to the Army of the North, where he took command, and successfully repulsed the enemy. As a member of the Committee Carnot was formally responsible for the decrees of Robespierre. In 1797 Carnot, having unsuccessfully opposed Barras, had to escape to Germany, but returned, and was appointed minister of war by Napoleon (1800). For seven years after this Carnot remained in retirement, publishing several valuable military works. In 1814 Napoleon gave him the chief command at Antwerp, and in 1815 the post of minister of the interior. After the emperor's second fall he retired from France.

**Caroline**, British queen (1768-1821), a daughter of the Duke of Brunswick-Wolfenbüttel. In 1795 she was married to the Prince of Wales, afterward George IV. When the Prince of Wales assumed the throne in 1820 he offered her an income of \$250,000 on condition that she would never return to England, on account of reports which were circulated against her honor. She refused, and in June of same year entered London amid public demonstrations of welcome. The government now instituted proceedings against her for adultery, but the public feeling and the splendid defense of Brougham obliged the ministry to give up the Divorce bill after it had passed the Lords. Though banished from the court, the queen assumed a style suitable to her rank.

**Caroline Islands** (or New Phillppines), a large archipelago, North Pacific Ocean, between the Philippines and the Marshall Isles, first discovered by the Spaniards in 1543, if not by the Portuguese in 1525. The most impor-

tant vegetable productions are palms, breadfruit trees, and bananas. The islands are claimed by Spain.

**Caron,** SIR ADOLPHE, Canadian statesman (1843), practised law and became queen's counsel in 1879. He entered the Dominion Parliament as a Conservative in 1873, became minister of militia in November, 1880, which position he held for over ten years.

**Caro'tid Arteries,** the two great arteries which convey the blood from the aorta to the head and brain. The common carotids, one on either side of the neck, divide each into an external and an internal branch. The external carotid passes up to the level of the angle of the lower jaw, where it ends in branches to the neck, face, and outer parts of the head. The internal carotid passes deeply into the neck, and through an opening in the skull behind the ear enters the brain, supplying it and the eye with blood.

**Carp**, a genus of soft-finned abdominal fish distinguished by the small mouth, toothless



a.-fore fin; b.-hind fin; c.-anal fin; d.-large barbule.

jaws, and gills of three flat rays. The common carp is olive green above and yellowish below, and in many parts is bred in ponds for the use of the table. It is said to live to the great age of 100 or even 200 years. The wellknown goldfish is of this family and is believed to be originally from China.

**Carpa** thian Mountains, a range of mountains in Southern Europe, chiefly in Austria, forming a great semicircular belt of nearly 800 mi. in length. The Carpathian range is rich in minerals, including gold, silver, quicksilver, copper, and iron.

**Car' pel**, in botany, a single-celled seed-vessel, or a single cell of a seed-vessel. The pistil or fruit often consists of only one carpel, in which case it is called *simple*; when either consists of more than one carpel it is called *compound*.

**Carpenta**' ria, GULF OF, a large gulf on the north coast of Australia.

**Carpenter,** MATTHEW HALE (1824-1881), American jurist and statesman. He spent two years at West Point. In 1847 he was admitted to the bar in Vermont. The year following he settled at Beloit, Wis., from whence he removed to Milwaukee in 1856. He was considered the greatest constitutional lawyer of his time. and tried many important cases before the U. S. Supreme Court. From 1869 to 1875, he was U. S. senator from Wisconsin.

30

# Carpenter

In 1870 he was again elected to the Senate, and died in office.

**Carpenter**, WILLIAM BENJAMIN (1813-1885), an English physiologist. He wrote several well-known works on physiology: *Principles of General and Comparative Physiology; Principles of Mental Physiology; Principles of Human Physiology;* a Manual of Zoology, etc. He took a leading part in the expeditions sent out by government in 1868-70 for deep-sea exploration in the North Atlantic. **Carpenter Bee**, the common name of the

**Carpenter Bee**, the common name of the different species of hymenopterous insects of the genus *Xylocopa*. The species are numerous in Asia, Africa, and America, and one



Carpenter Bee (Xylocopa).

Showing the cells for eggs and larvæ, excavated in dead wood.

species inhabits the South of Europe. They are generally of a dark, violet blue, and of considerable size.

Car' pentry is the art of combining pieces of timber to support a weight or sustain pressure. The work of the carpenter is intended to give stability to a structure, that of the joiner is ap-plied to finishing and decoration. The term frame is applied to any assemblage of pieces of timber firmly connected together. The points of meeting of the pieces of timber in a frame are called *joints.* Lengthening a beam is uniting pieces of timber into one length by joining their extremities. When neatness is not required this is done by fishing, that is, placing a piece of timber on each side of where the beams meet and securing it by bolts passed through the whole. When the width of the beam must be kept the same throughout scarf-ing is employed. When greater strength is required than can be produced by a single beam building and trussing beams are resorted to. In trussing the beam is cut in two in the direction of its length, and supported with cross beams, as in roofing. Mortise and tenon is a mode of jointing timber. The timber frame-work of floors is called naked flooring, and is single if there be but a single series of joists, double if there are cross binding joists, and framed if there are girders or beams in addition to the joists. The roof is the framework by which the covering of a building is supported. The principal instruments used in carpentry

#### **Carpet Sweepers**

are saws, as the circular, band, and tenon saws; planes, as the jack plane, smoothing plane, molding plane, chisels, gouges, gimlets, etc.

Carpet, a thick fabric, generally composed wholly or principally of wool, for covering the floors of apartments, staircases, and passages in the interior of a house. They were origi-nally introduced from the East, where they were fabricated in pieces, like the modern rugs, for sitting on. Eastern carpets are still highly thought of in Europe. The Persian, Turkish. and Indian carpets are all woven by hand, and the design is formed by knotting into the warp tufts of woolen threads. Of carpets made in this country and Europe Brussels carpet is a common and highly esteemed variety. It is composed of linen thread and worsted, the lat-ter forming the pattern. The linen basis does not appear on the surface, being concealed by the worsted, which is drawn through the reticulations and looped over wires that are afterward withdrawn, giving the surface a ribbed appearance. Wilton carpets are similar to Brussels in process of manufacture, but in them the loops are cut open by using wires with a knifeedge, and the surface thus gets a pile.

**Carpet-bagger**, a needy political adventurer who goes about the country pandering to the prejudices of the ignorant with the view of getting into place or power, so called because regarded as having no more property than might fill a *carpet-bag*. Originally applied to needy adventurers of the Northern states of America who tried in this way to gain the votes of the negroes of the Southern states.

of the negroes of the Southern states. **Carpet Sweepers.**—The first sweepers were manufactured in 1858 in Boston. The original sweeper was very crude as it was made almost entirely by hand. The infant industry was ruined by the war but sprung up again in the early '70's when several factories were established in different parts of the country. There are now carpet-sweeper factories in several countries of Europe, but they have not perfected automatic machinery to the extent that Americans have, and in consequence their product is of inferior quality.

uct is of inferior quality. The principal parts of a carpet sweeper are the bail, case, brush, and wheels. The bail is a metal attachment which circles half way around the sweeper and to which the handle is attached. It is of malleable iron and comes to the sweeper factory warped and crooked. It is placed in a press, which, with a single blow, straightens it out completely. The bail is then polished on emery wheels or belts and is passed to a room where it is boiled in lye and copper and nickel-plated or Japanned before receiving the final polish on cloth wheels. preparatory to being sent to the assembly rooms. The wooden case is usually made of oak. It is run through dry-kilns and allowed to season thoroughly before it is cut up into the proper sizes. The brush is a wooden roller thickly studded with bristles. They are turned out in machines which work automatically. and are given a coat of black filler before reaching the factory. These rollers are first placed in a machine which bores the holes for the

## Carracci

bristles which are put in by machinery. They are arranged on a long tray and are fed into the machine from the back. A little prong jerks out just enough of the bristles for a bunch and passes it to a pair of metal fingers, which encircle the bunch around the middle with a staple of wire, and then pass it to another pair of fingers, which press the bunch of hair into the hole in the roller, and spread the staple until it penetrates the wood and anchors the bristles far stronger than could be done with glue. The brush is put through a machine where it is properly trimmed when it goes to the assembling room. The wooden wheels are turned out at the rate of 100 a minute and are carefully finished and painted. The metal wheels are sent to the rubbering room where rubber bands are put on. The tin for the bot-tom pans is cut and put in proper shape by automatic machinery. The wire for the springs of the sweeper comes in heavy coils and is also cut into the required length by automatic machinery. Every part of the sweeper is constantly moving toward the assembly room. Each part is kept separate and has an apartment for itself. In the assembling room the parts are all put together and the machine thoroughly tested.

Carracci (kar-rach-ē), Ludovico, Agostino, and ANNIBALE (1555-1619), the three founders of the Bologna, or, as it has been called, the eclectic school of painting.

Carrageen. See Irish Moss.

**Carra'ra**, a city of Northern Italy, 59 mi. s.w. of Modena. It is surrounded by hills which contain fine white statuary marble. Pop. 11,869. The Carrara marble is the variety generally employed by statuaries. Although the Carrara quarries have been worked for 2,000 years, having furnished the material for the Pantheon at Rome, the supply is still practically inexhaustible. They employ 6,000 or 7,000 men.

Carrickfer'gus, seaport of Ireland, county Antrim: memorable as the landing place of King William III, 1690. There are some manufactures, principally linen, and extensive fisheries. Pop. 10,009.

Carrier (kar-yā), JEAN BAPTISTE (1746-1794), an infamous character of the first French revolution. In 1792 he was chosen member of the National Convention. In October, 1793, he was sent to Nantes to suppress the civil war, and to finally put down the Vendeans. He first caused ninety-four priests to be conveyed to a boat with a perforated bottom, under pretense of transporting them, but in-stead they were drowned by night. This artifice was repeated a number of times, while Carrier also caused multitudes of prisoners to be shot without any pretense of trial. Some months before the fall of Robespierre, Carrier was recalled and guillotined.

Carrier Pigeon, a variety of the common domestic pigeon used for the purpose of carrying messages. Several varieties are thus employed but what is distinctively called the carrier pigeon is a large bird with long wings, large tuberculated mass of naked skin at



the base of the beak and with a circle of naked skin around the eyes. Pigeons have been employed in this way at a very ancient date, but there appear to be some differences of opinion as to who first so utilized them. Probably the first on record who employed pigeons in this Homing Pigeon, capacity was Joshua. who,

or Messenger. when invading Palestine (in the sixteenth century B.C.), employed them as mediums of communication between headquarters and camps in lands far on the other side of the Jordan. The Chinese are said to have used pigeons to carry messages at even an earlier date than this. The Greek poet Anacreon, who lived 500 years B.C., mentions the use of pigeons as bearers of epistles. Pliny, the Roman naturalist, speaks of communications being kept up between Hirtius and Decimus Brutus at the siege of Mutina (Modena) by means of pigeons; and there is an instance recorded of their having been employed during the crusade of St. Louis. One writer has recorded the employment of pigeons to carry messages to Mahmoud Malek-al-Adel Nour-Eddin, sultan of Egypt, in the twelfth century. During the siege of Paris, 150,000 official messages were carried into the city by pigeon post. Carrier pigeons in calm weather fly on an average 1,200 yards a minute; with a moderate breeze in their favor they make 1.500 yards a minute; while with the wind strongly in their favor, they attain a speed of 2,000 yards per minute. The record for distance is held by an American homing pigeon, which recently made a journey of 1,040 mi. without a stoppage. An actual post system in which pigeons were the messengers was established at Bagdad by the Sultan Nureddin Mahmud, who died in 1174, and lasted until 1258 when Bagdad fell into the hands of the Mongols. These birds can be used in this way only in virtue of what is called their "homing" faculty or instinct, which enables them to find their way back home from surprising distances. They are better to get some training by trying them first with short distances, which are then gradually increased. Large numbers of these birds are now kept in England, Belgium, France, etc., there being numerous pigeon clubs which hold pigeon races to test the speed of the birds. These races to test the speed of the birds. pigeons are also kept in several European countries for military purposes.

Carrion Crow, the common crow, so called because it often feeds on carrion. The name is also given to a small species of vulture, called the black vulture.

Carroll, CHARLES, of Carrollton (1737-1832), American statesman. At the outbreak of the Revolution he was the wealthiest man in the colonies, and he was ever ready to use his influence and means for the aid of liberty. As early as 1770, he had protested against arbitrary taxation, in 1774 was appointed one of the committee of correspondence for the province, and in 1775 was elected a member of the Council of Safety. In 1776 he was elected to the Continental Congress from Maryland, and signed the Declaration of Independence. He was again a delegate to Congress in 1777, and served on the committee which visited Valley Forge to investigate complaints about General Washington. In 1788 he was elected the first senator from Maryland under the Constitution of the U. S., serving until 1791. He was again elected to the state senate, and served until 1801. He was the last surviving signer of the Declaration of Independence.

**Carroll**, JOHN (1735-1815), American Catholic archbishop. He was a cousin of Charles Carroll, of Carrollton, being descended from the Carrolls who emigrated to Maryland about the year 1689. In 1789 he was appointed first bishop in the U. S., with his see in Baltimore. He was an ardent Federalist, and one of the most powerful factors of his church in this country. Pious, learned, patriotic, and eloquent, he represented one of the oldest familles of Ireland and Maryland, and its union with the Jesuits. Congress invited him to deliver a panegyric on Washington, on Feb. 22, 1800. His writings are chiefly controversial.

**Carrot**, a biennial umbelliferous plant. There are three chief varieties. The leaves are tripinnate, of a handsome feathery appearance. The plant rises to the height of 2 ft., and produces white flowers. The root is small, tapering, of a white color, and strong flavored; but that of the cultivated variety is large, succulent, and of a red, yellow, or pale straw color, and shows remarkably the improvement which may be effected by cultivation. It is cultivated for the table and as a food for cattle.

**Carson City**, Ormsby co., Nev., in Eagle Valley, near the foot of the Sierra Nevada, 178 mi. n.e. of San Francisco. Surrounding country, lumber and mining. A U. S. branch mint for dealing with the immense quantities of gold and silver produced in this region is located here. Pop. est. 1897, 4,500.

**Carson**, CHRISTOPHER (1809-1868), a famous American frontiersman, better known as "Kit," b. in Kentucky; d. in Colorado. He became famous as a scout and trapper, and guided Fremont across the Rocky Mountains. His name is classed with those paladins of the Western plains such as Crockett, Boone, and W. F. Cody.

**Cart**, a carriage with two wheels, with or without springs, fitted to be drawn by one horse.

**Cartagena**, (or Carthagena) (kár-tà- $\hbar$ ā' nă, kár-thă-jē'na), a seaport of Spain, in the province of and 31 mi. s.s.e. of Murcia; with a harbor which is one of the largest and safest in the Mediterranean, sheltered by lofty hills. It is a naval and military station. Lead smelting is largely carried on; and there are in the neighborhood rich mines of excellent iron. Esparto grass, lead, iron ore, oranges, etc., are exported. Cartagena was founded by the Carthaginians under Hasdrubal about 243 B.C., and was called New Carthage. It was taken by Scipio Africanus B.C. 210, and was long an important Roman town. It was ruined by the Goths, and revived in the time of Philip II. Pop. 84,171.

**Cartagena** (or Carthagena) (kár-tá- $\hbar$ á 'ná, kár-tha-jē'na), a seaport of Colombia. on the Caribbean Sea, capital of the state of Bolivar. The exports are coffee, cotton, ivory nuts, rubber, hides, etc. The trade, which had partly gone to Sabanilla and Santa Marta, is being again recovered since the reopening of the canal to the river Magdalena. Pop. 8,600.

**Carta** 'go, a town of Central America in Costa Rica. It formerly had a population of about 37,000, but was utterly ruined by an earthquake in connection with an eruption of a neighboring volcano in 1841, so that its population has decreased to 6,000.

**Carta'go**, a town in Colombia, in the valley of the Cauca, in a well cultivated district and with a good trade. Pop. 8,000.

**Carte Blanche** (kårt-blånsh) (literally *white* or *blank paper*), a blank paper duly signed, entrusted to a person to fill up as he pleases, and thus giving unlimited power to decide. Thus in 1649 Charles II tried to save his father's life by sending from The Hague to the Parliament a signed carte blanche to be filled up with any terms which they would accept as the price of his safety. In 1832 Earl Grey was said to have been armed with a carte blanche for the creation of new peers.

**Carte' slan Diver**, a hydrostatic toy consisting of a little hollow glass figure, which has a small opening some distance below the top, and is rather lighter than an equal column of water, so as to be able to float. The figure is placed in a bottle or cylindrical vessel of water, closed with a piece of bladder or india rubber so as to exclude air. On pressing this with the finger the air inside the figure is compressed, it sinks down, and from the introduction of a small quantity of water becomes specifically heavier. By removing the pressure the water is expelled.

Car' thage, the most famous city of Africa in antiquity, capital of a rich and powerful commercial republic, situated in the territory now belonging to Tunis. Carthage was the latest of the Phoenician colonies in this district, and is supposed to have been founded by settlers from Tyre and from the neighboring Utica about the middle of the ninth century before Christ. The history of Carthage falls naturally into three epochs. The first, from the foundation to 410 B.C., comprises the rise and culmination of Carthaginian power: the second, from 410 to 265 B.C., is the period of the wars with the Sicilian Greeks; the third, from 265 to 146 B.C., the period of the wars with Rome, ending with the fall of Carthage.

The rise of Carthage may be attributed to the superiority of her site for commercial purposes, and the enterprise of her inhabitants.

In extending her commerce Carthage was naturally led to the conquest of the various islands which from their position might serve as entrepôts for traffic with the northern shores of the Mediterranean. The First Punic War, in which Rome and Carthage contended

for the dominion of Sicily, was prolonged for twenty-three years, B.C. 264 to 241, and ended, through the exhaustion of the resources of Carthage, in her expulsion from the island. The loss of Sicily led to the acquisition of Spain for Carthage. The Second Punic War, arising out of incidents connected with the Carthaginian conquests in Spain, and conducted on the side of the Carthaginians by the genius of Hannibal, and distinguished by his great march on Rome and the victories of Lake Trasimene, Trebia, and Cannæ, lasted seventeen years, B.C. 218 to 201, and after just missing the overthrow of Rome, ended in the complete humiliation of Carthage. The policy of Rome in encouraging the African enemies of Carthage occasioned the Third Punic War, in which Rome was the aggressor. This war, begun B.C. 150, ended B.C. 146, in the total destruction of Carthage.

The constitution of Carthage, like her history, remains in many points obscure. After the destruction of Carthage her territory became the Roman province of Africa. Twentyfour years after her fall an unsuccessful attempt was made to rebuild Carthage by Caius Gracchus. This was finally accomplished by Augustus, and Roman Carthage became one of the most important cities of the empire. It was destroyed by the Arabs in 638. The religion of the Carthaginians was that of their Phenician ancestors. They worshiped Moloch or Baal, to whom they offered human sacrifices: Melkart, the patron deity of Tyre; Astarte, the Phenician Venus, and other deities.

Carthage, Jasper co., Mo., on Spring River, 150 mi. s. of Kansas City. Railroads: St. L. & S. F.; and Missouri Pacific. Industries: stone quarries, five flouring mills, two iron foundries, woolen mill, and carriage, bed spring, and window bracket factories. Surrounding country agricultural and mineral (zinc mines). The town was first settled in 1843 and became a city about 1865. Pop. est. 1897, 12,000.

**Cartier,** SIR GEORGE ÉTIENNE (1814-1873), Canadian statesman. He was admitted to the bar in 1835, took part in the rebellion of 1837, and had for a time to leave Canada. In 1848 he entered the Canadian Parliament, and in 1855 became provincial secretary. Next year he became attorney general for Lower Canada, in which post he was active in behalf of legal reforms. In 1857 he was a member of the Macdonald ministry, and in 1858 he himself became premier. He was active in bringing about the establishment of the Dominion of Canada in 1867, and held a post in the first Dominion cabinet.

**Cartier** (kär-tyä), JACQUES, a French navigator, b. at St. Malo, 1494, time of death not known. He commanded an expedition to North America in 1534, entered the Straits of Belle Isle, and took possession of the mainland of Canada in name of Francis I. He subsequently went to found a settlement in Canada, and built a fort near the site of Quebec. He was living in France in 1552.

Car'tilage (or Gristle), a firm and very elastic

substance occurring in vertebrate animals. When cut, the surface is uniform, and contains no visible cells, cavities, or pores. It enters into the composition of parts whose functions require the combination of firmness with pliancy and flexibility. The ends of bones entering into the formation of a joint are always coated with cartilage. Temporary cartilages are those from which bones are formed by ossification. The permanent cartilages are of various kinds. They are found in the external ear, and aid in forming the nose, the larynx, etc.

Cartoon', in painting, a drawing intended to be used as a model for a large picture in fresco, a process in which it is necessary to complete the picture portion by portion and in which a fault cannot afterward be easily corrected. The cartoon is made exactly the size of the picture intended, and the design is transferred to the surface to be ornamented by tracing or other processes. Cartoons executed in color are used for designs in tapestries, mo-saics, etc. The most famous are those painted by Raphael for the Vatican tapestries. In modern times the term is also applied to a pictorial sketch relating to some notable character or events of the day, and in 1897 an effort was made by legislation in the state of New York to restrain newspapers from printing cartoons without the consent of the person depicted. The attempt failed.

**Cartouche** (kär'tösh), 1. In architecture, a sculptured ornament in the form of a scroll unrolled, often appearing on the cornices of columns, used as a field for inscriptions, etc. 2, In heraldry, a sort of oval shield, much used by the popes and secular princes in Italy, and others, both clergy and laity, for painting or engraving their arms on. 3, The name given to that oval ring or border which includes, in the Egyptian hieroglyphics, the names of persons of high distinction.

**Car' tridge**, a case of paper, parchment, or flannel suited to the bore of firearms, and holding the exact charge, including, in the case of small'arms, both powder and bullet. The cartridges used for breech-loading rifles contain the powder in a case of solid brass, and have the percussion cap by which they are ignited fixed in the base. Such cases can be refilled and used a number of times in succession. Cartridges for large guns are usually made of flannel and contain only the powder. Blank cartridge is a cartridge without ball or shot. Cartridges for blasting are filled with dynamite or other explosive.

**Cartwright,** EDMUND (1743-1823), the inventor of the power loom. He was educated at Oxford, and took orders in the church. In 1785 he brought his first power loom into action. Although much opposed both by manufacturers and workmen, it made its way, and in a developed and improved form is now in universal use. Cartwright spent much of his means in similar inventions, and fell into straitened circumstances. from which a parliamentary grant of \$50,000 relieved him.

Cartwright, SIR RICHARD, b. 1835, Canadian

statesman, entered the Dominion Parliament as a Conservative in 1863, and in 1870 identified himself with the reform party. Minister of finance in 1873 under Mr. Mackenzie.

of finance in 1873 under Mr. Mackenzie. **Caru' pano,** seaport of Venezuela, on the peninsula of Paria. Pop. 12,389.

**Car'ver, JOHN** (1575-1621), the first governor of the Plymouth colony in the New World, was b. in England and went to Leyden, then a refuge for the Puritans. He was an elder in the church, and in 1620 sailed with the Pilgrims in the *Mayflower*. C. was a prudent and firm ruler, but did not long survive his arrival in New England, dying at Plymouth.

**Carvin** (kar-van) (or Carvin Epinay), a town of France, dep. of Pas de Calais; industries: coal mining, iron founding, distilling, beet root sugar, flax-spinning, etc. Pop. 8,000.

**Carving**, as a branch of art, is the process of cutting a hard body by means of a sharp instrument into some particular shape, and is a term generally employed in speaking of figures cut out in ivory or wood. In the early and middle ages wood carving became general for the decoration of Christian churches and altars. One of the latest developments in the art of carving is the modern invention of carving by machinery. A machine patented in 1845 by Jordan is capable of copying any carved design that can be produced, so far as that is possible, by revolving tools; the finish is afterward given by hand labor.

**Cary**, ALICE (1820–1871), American novelist. She published several novels, including *Clover*nook, *Pictures of Country Life*, and *The Bishop's* Son, and wrote many domestic poems.

**Cary,** REV. HENRY FRANCIS (1772-1844), British author. In 1805 appeared his translation of Dante in English blank verse. He subsequently translated the *Birds of Aristophanes* and the *Odes of Pindar*. In 1826 he was appointed assistant librarian in the British Museum, and retired in 1837 on a pension of \$1,000 a year.

**Caryat'ides** (-dēz) (or Car'yatids), in architecture, figures of women dressed in long robes, serving to support entablatures. Corresponding male figures are *Atlantes*.

**Casale** (kā-sā'lā), a city of Northern Italy, province of Alessandria, on the Po, 18 mi. n.n.w. of Alessandria. Silk is the chief industry. Pop. 17,096.

**Casano'va**, GIOVANNI JACOPO, DE SEIN-GALT (1725-1798), known by his *Memoirs* as an adventurer who acted a prominent part in all situations, among all classes of society, and in all the large cities of Europe, by turns acting the part of diplomatist, preacher, abbot, lawyer, and charlatan.

**Casau'bon,** ISAAC DE (1559-1614), classical scholar. In his ninth year he spoke Latin fluently. In 1582 he became professor of the Greek language at Geneva. Henry IV invited him to Paris and made him royal librarian. After the death of Henry IV he followed Sir Henry Wotton, envoy extraordinary from James I, to England, where he was received with distinction, had two benefices and a pension conferred on him.

**Cascade Range**, a range of mountains in the U. S., British Columbia, and Alaska, near the Pacific coast, to which they are parallel, extending from the Sierra Nevada in California northward to Alaska. It contains several active volcances. Highest peak, Mount St. Elias. 19,500 ft. The highest peaks in the U. S. portion of it are in Washington, where Tacoma reaches 14,444 ft.

**Cascaril'la**, the aromatic bitter bark of a small tree of the nat. order Euphorbiaceæ. The name has recently been applied also to a subdivision of the genus *Cinchona*.

**Casco Bay**, a bay of Maine, between Cape Elizabeth on w.s.w. and Cape Small Point on e.n.e. Within these capes are more than 300 small islands, most of them very productive.

small islands, most of them very productive. **Case**, in grammar, a modification or inflection of a noun, pronoun, or adjective, by which a different shade of meaning is communicated to the word. In nouns and pronouns case supplies the place of prepositions, indicating the relation of the word thus modified to other words in the phrase or sentence. There is only one case in English for nouns, the possess-English pronouns have three ive or genitive. cases-nominative, genitive, and accusative. In Sanskrit there are eight cases. In French, Italian, Spanish, and Portuguese the nouns have no case inflections. In German there are four cases, nominative, genitive, dative, accusative.

**Case-hardening** is a process by which iron is superficially converted into steel, in such articles as require the toughness of the former conjointly with the hardness of the latter substance. The articles intended for case hardening are first manufactured in iron, and are then placed in an iron box, with charcoal in powder, and heated to redness. Immersion in water then converts the surface into a coating of steel.

**Casein** (kā'sē-in), that ingredient in milk which is coagulated by the action of acids and constituting the chief part of the nitrogenized matter contained in it. Cheese made from skimmed milk and well pressed is fully half casein. Casein is one of the most important elements of animal food as found in milk and leguminous plants. It consists of carbon 53.7 per cent., hydrogen 7.15, nitrogen 15.65, oxygen 22.65, and sulphur 0.85.

**Case mates**, in fortification, vaults which are proof against bombs, and which may serve as a place for keeping ordnance, ammunition, etc.

**Caser'ta** (or Caserta Nuova), the capital of the province of Caserta, South Italy, 18 mi. from Naples. The principal edifice is the royal palace, a large and richly-decorated structure, commenced in 1752 by Charles III of Spain. Pop. 31,349.

**Case Shot,** in artillery, is formed by putting a quantity of small iron balls into a cylindrical tin box called a *canister*, that just fits the bore of the gun. The shrapnel shell is a modern variety of case shot.

**Cashew'**, a tree common in the West Indies. Its fruit is called the cashew nut. The nut is

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## Cashmere

small, kidney-shaped, ash-gray, and contains an acrid juice. It is used to flavor Madeira wine, and is eaten cooked in various ways.



Cashew Nut.

The stalk or receptacle of the nut is large and fleshy and has an agreeable acid flavor.

Cash'mere (or Kash'mir), an extensive principality in the n.w. of Hindustan, subject to a ruler belonging to the Sikh race. It is politically subordinate to the British-Indian em-pire. The principality embraces Cashmere, Jamoo or Jummoo, Baltistan or Little Thibet, Ladakh, Gilghit, etc. The area is estimated at 80,900 sq. mi. Cashmere proper, which forms a small portion of the whole, is a valley surrounded by mountains, the Himalaya and Hindu Kush, and traversed by the river There are ten chief passes through Jhelum. the mountains into this valley, varying in height from about 9,000 to 12,000 ft. The elevated situation of the valley, and the mountains of snow which surround it, render the climate rather cold; but the region is well watered by streams and very fertile. Forests on the slopes, fields of corn, rice crops along the sides of the rivers, rich orchards, and an abundant growth of flowers distinguish the district. Among its minerals are iron and plumbago. Sulphur springs are common. Earthquakes frequently occur, and in 1885 one caused the loss of thousands of lives. Bears, leopards, wolves, the ibex and chamois are among the animals. The common European fruits are grown, and attention is now being paid to the culture of the vine. The chief crops are wheat, barley, rice, and Indian corn, and two harvests are reaped in the year. The chief manufacture is that of the celebrated Cashmere shawl. The genuine Cashmere shawls owe their superiority to the material of which they are made, which is properly speaking not wool, but a fine kind of down with which the animals of this region are clad during the winter season, and which in length and fineness far surpasses the merino wool. This down is obtained in

## Cassareep

great quantities from the Cashmere goat, the yak of Thibet, and the wild sheep. It is spun by women and girls, and then passes into the hands of the dyers. From the dyers the yarns are passed to the weaver, and the shawl is woven in stripes which are afterward very skillfully sewed together. The average time taken to manufacture a good Cashmere shawl is from sixteen to twenty weeks. The inhabitants are a fine race physically. There are thirteen separate dialects in use. The capital of the whole principality is Jamoo. Srinagar (or Cashmere) is the maharajah's summer residence and largest town. Pop. 2,543,952.

**Cashmere Goat**, a variety of the common goat remarkable for its fine downy fleece, said to be found in perfection only in Thibet in the neighborhood of Lhassa, but also found in other parts of this region, including Ladakh, now a province of Cashmere. The colder the region where the goat pastures, the heavier is its fleece. A full-grown goat yields not more than 8 oz. A large shawl of the finest quality requires 5 lbs. of the wool; one of the inferior quality from 3 to 4 lbs.

**Casplan Sea**, a large lake or inland sea between Europe and Asia; area 170,000 sq. mi.; the largest isolated sheet of water on the globe. Its surface is 85 ft. below that of the Sea of Azof; greatest depth about 3,250 ft. Russian territory surrounds it on three sides, Persia on the fourth. It abounds in shallows, making navigation difficult. The water is less salt than that of the ocean, of a bitter taste, and of an ochre color, without ebb or flow. The fisheries are valuable. Steam packets are now established on it. The Russians have also a fleet of war ships in the Caspian.

**Cass.** LEWIS (1782-1866), an American statesman, b. in Exeter, New Hampshire. In 1813, having entered the army, he rose to the rank of general; in 1814-30 was governor of Michigan, was minister of war in 1831, was a candidate for the presidency several times, was long a senator, and in 1857-60 was secretary of state. He wrote the *History, Traditions, Lan*guages, etc., of Indians in the United States.

**Cassan'der** (B.C. 354-297), a king of Macedonia. He displaced his brother Polysperchon in the regency, removed in succession the mother, the wife, and the son of Alexander the Great to make way for himself to the throne. He married Thessalonica, Alexander's half-sister, and founded the city of that name in her honor.

**Cassan'dra**, in Greek legend, a daughter of Priam and Hecuba. She is fabled to have been endowed by Apollo with the gift of prophecy. She frequently foretold the fall of Troy, and warned her countrymen in vain against the strategem of the horse.

**Cas' sarcep** (Cassireep), the concentrated juice of the roots of the common or bitter cassava, flavored by aromatics and deprived of its poisonous properties by boiling. Used to give a relish to soups and other dishes, forming the basis of the West Indian "pepper pot." It is a powerful antiseptic, and very useful in keeping meat fresh in a tropical climate. **Cassa'va**, a South American shrub, about 8 ft in height, with broad, shining, and handshaped leaves, and beautiful white and rosecolored flowers. A nutritious starch is obtained from the white, soft root of the plant, and is called by the same name. It is prepared in the West Indies, tropical America, and in Africa. From cassava the tapioca of commerce is prepared. Another species, the sweet cassava, has roots the juice of which is an agreeable and nutritive food.

**Cas'sel** (or Kassel), formerly the residence of the elector of Hesse-Cassel, is now the chief town in the province of Hessen-Nassau, Prussia, on the Fulda, 91 mi. n.n.e. of Frankforton-the-Main. The city has manufactures of machinery, mathematical instruments. gold and silver wares, chemicals, knives, gloves, leather, porcelain, etc. Pop. 58,290.

**Cas' sia**, a large genus of leguminous plants found in the tropical parts of the world. The species consist of trees, shrubs, or herbs; the leaves are abruptly pinnated, and usually bear glands on their stalks. The leatlets of several species constitute the well-known drug called senna. The leaves and flowers are purgative. The bark and roots of several of the Indian species are much used in medicine. *Cassia bark* is a common name for the bark of au entirely different plant belonging to the laurel family. Its flavor resembles that of cinnamon, and as it is cheaper it is often substituted for it. The cassia of the Bible was probably cassia bark.

**Cas' sicus**, an American genus of insessorial birds, the Cassicans (American orioles), allied to the starlings, remarkable for the ingenuity with which they weave their nests. The crested oriole, a South American bird, constructs a pouch-shaped nest of the length of 30 in.

Cassi'ni, a name famous in astronomy and physics for three generations: 1, GIOVANNI DOMENICO (1625-1712), became professor of astronomy at the University of Bologna, but afterward settled in France. He discovered four new satellites of Saturn and the zodiacal light, proved that the axis of the moon is not perpendicular to the plane of the ecliptic, and showed the causes of her libration. 2, JACQUES. his son (1677–1756). After several essays on subjects in natural philosophy, etc., he completed his great work on Saturn's satellites and ring. His labors to determine the figure of the earth are well known. 3. CASSINI DE THURY, CESAR FRANÇOIS (1714-1784), son of the preceding, member of the Academy from his twenty-second year, undertook a geometrical survey of the whole of France, which was com-pleted by his son. 4, CASSINI, JEAN DOMI-NIQUE, COUNT DE THURY (1748-1845), son of the preceding, was a statesman and mathematician. In 1787 he completed the topographical work which was begun by his father.

**Cassi**' no, a game at cards somewhat resembling whist.

**Cassiodorus** (or Cassiodorius), MAGNUS AUER-LIUS, a Roman writer, of the fifth century A. D. He became chief minister of the Ostrogoth king Theodoric, and wrote a collection of letters, Variarum Epistolarum Libri XII, which contain most valuable information with regard to the Ostrogothic rule in Italy.

**Cassiopela** (- $p\bar{o}'ya$ ), a conspicuous constellation in the northern hemisphere, situated next to Cepheus, and often called the *Lady in her Chair*. It contains fifty-five stars, five of which, arranged in the form of a W, are of third magnitude.

**Cassiquiari** (kå-sik-i-ā're) (or Cassiquia're), a large river of South America, in Venezuela, which branches off from the Orinoco and joins the Rio Negro, a tributary of the Amazon. Length 130 mi.

**Cassiter' ides** (-děz), a name derived from the Greek kassiteros, tin, and anciently applied to the tin district of Cornwall, or the Scilly Isles.

**Cassit'erite**, an ore of tin widely distributed, and the one from which most of the metal is obtained. It is a peroxide, and consists of tin 79, oxygen 21.

**Cas' sius** (full name, CAIUS CASSIUS LONGI-NUS), a distinguished Roman, one of the assassins of Julius Cæsar. In the civil war that broke out between Pompey and Cæsar he espoused the cause of the former, and, as commander of his naval forces, rendered him important services. After the battle of Pharsalia he was apparently reconciled with Cæsar, but later was among the more active of the conspirators who assassinated him B.c. 44. He then, together with Brutus, raised an army, but they were met by Octavianus and Antony at Philippi. The wing which Cassius commanded being defeated, he imagined that all was lost, and killed himself, B.C. 42.

**Cas' sowary**, a family of birds akin to the ostrich, emeu, etc., among living, the moa and



Cassowary.

others among extinct, birds. The shortness of their wings totally unfits them for flying, and, like others of their order, the pectoral or wing muscles are comparatively slight and weak, while those of their posterior limbs are very robust and powerful.

**Cast**, in the fine arts, is an impression taken by means of wax or plaster of Paris from a statue, bust, bas relief, or any other model. When plaster casts are to be exposed to the weather their durability is greatly increased by saturating them with linseed oil, with which wax or resin may be combined.

**Casta'lla**, a celebrated fountain in Greece sacred to Apollo and the Muses, and fabled to have the power of inspiring those who drank its waters. It issues from a fissure between two peaked cliffs adjoining Mount Parnassus.

**Cas' tanets,** an instrument composed of two small concave shells of ivory or hardwood, shaped like spoons, placed together, fastened to the thumb, and beat with the middle finger. This instrument is used by the Spaniards and Moors as an accompaniment to their dances and guitars.

**Caste**, a term applied to a distinct class or section of a people marked off from others by certain restrictions, and whose burdens or privileges are hereditary. The word is derived from the Portuguese *casta*, a breed or race, and was originally applied to the classes in India whose occupations, customs, privileges, and duties are hereditary. It is probable that wherever caste exists it was originally grounded on a difference of descent and mode of living, and that the separate castes were originally separate races. It now prevails principally in India, but it is known to exist or to have existed in many other regions.

**Castelar'y Rissoli,** EMILIO, b. 1833, a Spanish statesman and author. In 1856 he was made professor of history in the University of Madrid, but becoming involved in the republican disturbances of 1866, he had to take refuge in Switzerland. Having gone back to Spain in 1868 he was returned to the Cortes in the following year. In 1873 he was elected president of the Republican Cortes, but resigned in January, 1874. After the pronunciamento in favor of Alphonso XII, Dec. 13, 1874, Castelar retired from Spain, but in a year or two returned, and has since been a member of the Cortes. He has published many novels, poems, and political works.

**Castel lamare.**—1, A seaport town of Italy, on the Gulf of Naples. It is fortified, and has a royal dockyard. manufactories of linen, silk, etc. Pop. 34,064. 2, A seaport on the north coast of Sicily, 20 mi. e. of Trapani. Wine, fruit, grain, oil, etc., are exported. Pop. 16,513.

**Castellon-de-la-Plana** (kås-tel-yon'), a town, Spain, capital of the province of Castellon, 40 mi. n.n.e. of Valencia. Manufactures of sailcloth, woolen and hempen fabrics, ropes, paper, soap, etc., and some trade in hemp. grain, and fruit. Pop. of town, 23,204; of province, 323,-474; area of latter, 2,445 sq. mi.

**Castel-Vetra**'no, a town, Sicily, province of Trapani. Industries: silk, linen, cotton, etc. The white wine produced in the neighborhood is esteemed the best in Sicily. Pon 22 448

is esteemed the best in Sicily. Pop. 22,448. **Castiglione** (kås-tēl-yō-nā), BALDASSARE. (1478-1529), one of the most elegant of the older Italian writers. Among his works the Libro del Cortegiano (Book of the Courtier) is the most celebrated.

**Castile** (kas-tēi'), an ancient kingdom of Spain, the nucleus of the Spanish monarchy, extends over a large part of the peninsula from the Bay of Biscay southward. It is divided into New Castile and Old Castile. The former occupies nearly the center of the peninsula; area 44,718 sq. mi. This ancient province now forms the five provinces of Madrid, Ciudad-Real, Cuenca, Guadalajara, and Toledo. Pop. 2,249,769. OLD CASTILE stretches from the Bay of Biscay to New Castile; area 25,-408 sq. mi. Old Castile now forms the provinces of Burgos, Logroño, Santander, Soria, Segovia, Avila, Palencia, and Valladolid. Pop. 1,719,349.

**Castillejo** (kas-til-yā' $h\bar{0}$ ), CRISTO'VAL DE (1494-1556), a Spanish poet. His works possess great originality, and his language is pure and manly, yet sparkling with wit and satire.

**Casting,** the running of melted metal into a mold prepared for the purpose, so as to produce an article of a certain shape. For the various processes, see *Iron*, *Bronze*, *Brass*, *Steel*, etc.

**Cast iron**, the name given to the iron obtained from the blast furnace by running the fused metal into molds prepared for the purpose. The molds are in the form of long narrow channels, from which the iron, when it has cooled and solidified, is taken in bars called *pigs*, between 3 and 4 ft. long and 3 or 4 in. broad.

**Castle**, an edifice serving at once as a residence and as a place of defense, especially such an edifice belonging to feudal times. The first defense of a castle was usually the moat or ditch that sometimes comprised several acres; and behind it was the outer wall, generally of great height and thickness, strengthened with towers at regular distances, and pierced with loopholes through which missiles could be discharged at the assailants. The main entrance through the outer wall was protected by the barbican, with its narrow archway, and strong gates, and portcullis, and inside there were usually an outer and an inner court, and the strong, more or less detached building known as the keep, which formed the residence of the owner and his family. This was the most strongly constructed of all the buildings, to which the defenders retreated only in the last extremity. The walls were all strengthened by towers, either circular, square, oblong, or multangular. projecting both outward and inward. Such towers were capable of being defended independently of the castle. The gatehouses are distinct works covering the entrance; they contain gates, one or two portcullises, and loopholes raking the passage. From the front of these gatehouses the drawbridge was lowered over the ditch. The gate-ways had frequently a barbican attached. This was a passage between high walls, in advance of the main gate, and having an outer gate of entrance, which was defended by towers and the parapet connected with the main gateway. The top of the wall was de-



### Castletown

fended by a battlemented parapet, and frequently pierced by cruciform loopholes.

**Castletown**, a small town and seaport near the southern extremity of the Isle of Man, long the capital of the island. In the center is Castle Rushen, originally a Danish fortress of the tenth century, latterly much extended, and now partly used as a prison and public offices. Pop. 2,243.

**Castor and Pollux,** in Greek mythology, twin divinities, sons of Zeus (Jupiter) and Leda, also called Dioscūri (sons of Zeus). Castor was mortal, but Pollux was immortal. They were the patron deities of mariners. In the heavens they appear as one of the twelve constellations of the zodiac, with the name of *Gemini* (the Twins).

**Castor and Pollúx** are two minerals which are found together in granite in the island of Elba. Castor is a silicate of aluminum and lithium, pollux is a silicate of aluminum and the rare element cæsium.

**Castor oil,** the oil obtained from the seeds of a plant, a native of India, but now distributed over all the warmer regions of the globe. The oil is obtained from the seeds by bruising and pressing. The oil that first comes away, called cold-drawn castor oil, is reckoned the



Castor Oil Plant.

best. The oil is afterward heated to the boiling point, which coagulates and separates the albumen and impurities. Castor oil is used medicinally as a purgative. It is chiefly imported from India. The plant is often cultivated as an ornamental plant.

**Castro**, INEZ DE, a lady of noble birth, secretly married to Pedro, son of Alphonso IV, king of Portugal, after the death of his wife Constantia (1345). The old King Alphonso, fearful that this marriage would injure the interests of his grandson Ferdinand (the son of Pedro by his deceased wife), resolved to put Inez to death.

**Casuari na** (or Botany Bay Oak), the single genus of the Cassowary trees. There are about thirty species, natives chiefly of Australia. They are jointed leafless trees or shrubs, nearly related to the birches, having their male flowers in whorled catkins and their fruits in indurated cones.

**Cat**, a well-known domesticated quadruped, the same name being also given to allied forms of the same order. It is believed that the cat was originally domesticated in Egypt, and the gloved cat of Egypt and Nubia has by some

#### Catacombs

been considered the original stock of the domestic cat, though more probably it was the Egyptian cat. Some have thought that the domestic breed owed its origin to the wild cat. The domestic cat belongs to a genus-that which contains the lion and tiger-better armed for the destruction of animal life than any other quadrupeds. The short and powerful jaws, trenchant teeth, cunning disposition. combined with nocturnal habits (for which their eyesight is naturally adapted) and much patience in pursuit, give these animals great advantages over their prey. The cat in a advantages over their prey. The cat in a degree partakes of all the attributes of her race. Its food in a state of domestication is necessarily various, but always of flesh or fish if it can be obtained. It is a very cleanly animal. Its fur is easily injured by water on account of the want of oil in it, and it can be rendered highly electric by friction. It is usually regarded as less intelligent than the dog, but this is by no means certain. It has a singular power of finding its way home when taken to a distance and covered up by the way. Among the various breeds or races of cat may be mentioned the tailless cat of the Isle of Man (and the Crimea); the tortoise shell, with its color a mixture of black, white, and brownish or fawn color; the large Angora or Persian cat, with its long, silky fur; and the blue or Carthusian, with long, soft, grayishblue fur.

Catacombs, caves or subterranean places for the burial of the dead, the bodies being placed in graves or recesses hollowed out in the sides of the cave. Caves of this kind were common among the Phœnicians, Greeks, Persians, and many Oriental nations. In Sicily and Asia Minor numerous excavations have been discovered containing sepulchers, and the catacombs near Naples are remarkably extensive. Those of Rome, however, are the most im-portant. The term catacumbre is said to have been originally applied to the district near Rome which contains the chapel of St. Sebastian, in the vaults of which, according to tradition, the body of St. Peter was first deposited, but it is now applied in a special way to all the extensive subterranean burial places in the neighborhood of Rome, which extend underneath the town itself as well as the neighboring country, and are said to contain not less than 6,000,000 tombs. They consist of long narrow galleries usually about 8 ft. high and 5 ft. wide, which branch off in all directions, forming a perfect maze of corridors. Different stories of galleries lie one below the other. Vertical shafts run up to the outer air, thus introducing light and air, though in small quantity. The graves or *loculi* lie longwise in the gallerics. They are closed laterally by a slab, on which there is occasionally a brief inscription or a symbol, such as a dove, an anchor, or a palm branch, and sometimes all. The earliest that can be dated with any certainty belongs to the year 111 A.D. It is now regarded as certain that in times of persecution the early Christians frequently took refuge in the catacombs, in order to celebrate there

## Catalani

in secret the ceremonics of their religion; but it is not less certain that the catacombs served also as ordinary places of burial to the early Chrisians, and were for the most part excavated by the Christians themselves. In early times rich Christians constructed underground burying places for themselves and their brethren, which they held as private property under the protection of the law. But in course of time, partly by their coming under the control of the church and partly by accidents of pro-prietorship, these private burying grounds were connected with each other, and became the property, not of particular individuals, but of the Christian community. In the third century A.D. there were already several such common burying places belonging to the Christian congregations, and their number went on increasing till the time of Constantine, when the catacombs ceased to be used as burying places.

**Catala' ni,** ANGELICA (1779-1849), one of the most celebrated of Italian female singers. Family misfortunes compelled her to turn her remarkable voice to account, and in her 16th year she made her first appearance on the stage at Venice. After filling the chief soprano parts in the best opera houses of Italy she visited successively Madrid, Paris, and London, enjoying everywhere great professional triumphs, as she continued to do in similar tours which she repeatedly made afterward.

**Catalaunian Plain**, the wide plain around Chálons-sur-Marne, famous as the field where Attius, the Roman general, and Theodoric, king of the West Goths, gained a complete victory over Attila, 451 A.D.

**Catalep'sy**, a spasmodic disease, generally connected with hysteria, in which there is a sudden suspension of the senses and volition, with a statue-like fixedness of the body and limbs in the attitude immediately preceding the attack, while the action of the heart and lungs continues, and the pulse and temperature remain natural. It is generally the consequence of some other disease, or of a constitution enfeebled by the gradual operation of unobserved causes.

**Catalo nia,** an old province of Spain. Wheat, wine, oil, flax, hemp, vegetables, and almost every kind of fruit are abundant. There are mines of lead, iron, alum, etc. On the coast is a coral fishery. Catalonia stands preeminent for the industry of its inhabitants. Pop. 1,843,549; area 12,480 sq. mi. It comprises the modern provinces of Tarragona, Gerona, Lerida, and Barcelona.

**Catal pa**, a genus of plants, with simple leaves and large, gay, trumpet-shaped flowers. *C. syringifolia*, a North American species, is well adapted for large shrubberies, and has been introduced into England and other parts of Europe. *C. longissima* contains much tannin in its bark, and is known in the West Indies by the name of French oak.

**Catalysis** (or Contact Action), the chemical change which occurs when one body decomposes another without being itself changed;

## Cataract

thus oxide of cobalt decomposes a solution of bleaching powder into chloride of calcium and oxygen, itself remaining without change.

**Catamaran'**, a sort of raft used in the East Indies, Brazil, and elsewhere. Those of the island of Ceylon, like those of Madras and other parts of that coast, are formed of three logs lashed together. Their length is from 20



Indian Catamaran.

to 25 ft., and breadth  $2\frac{1}{4}$  to  $3\frac{1}{4}$  ft. The center log is much the largest, and is pointed at the fore end.

**Catamar'ca**, a province of the Argentine Republic, South America; area about 31,500 sq. mi.; mountainous in all directions except the south. Pop. 102,000. The capital is Catamarca, or more fully San Fernando de Catamarca. Pop. about 6,000.

**Cat'amount** (or Catamountain), the wild cat. The name is also given to the tiger or the puma.

Cata'nia, a city on the east coast of Sicily, in the province of Catania, at the foot of Mount Etna. It has been repeatedly visited by tremendous earthquakes, one of the worst of which was in 1693, when 18,000 people were destroyed, and has been partially laid in ruins by lava from eruptions of Mount Etna. The ruins of the amphitheater, which was more extensive than the Colosseum at Rome, are still to be seen, as also the remains of the theater, baths, aqueducts, sepulchral chambers, hippodrome, and several temples. The harbor was choked up by the eruption of 1669, so that for larger vessels there is nothing but a roadstead. In spite of this Catania has a considerable trade, and exports wheat, barley, wine, oil, etc. Pop. 103,715. Area of the province, 1,917 sq. mi.; pop. 656,827.

**Catanza** ro, a cathedral city, South Italy, capital of province of the same name, on a height, 5 mi. from the Gulf of Squillace, with manufactures of silk and velvet, and some trade in wheat, wine, oil, etc. Pop. 28,960. Area of prov. 2,030 sq. mi.; pop. 462,987.

**Cat'apult**, a machine of the ancients for projecting missiles, chiefly arrows. They may be described as a kind of gigantic cross-bows. *Balista* were engines somewhat similarly constructed, but were chiefly confined to the shooting of stones.

**Cat' aract**, a disease of the eye, consisting in an opacity of the crystalline lens, or its capsule, or both. It is quite different from amaurosis, which is a disease of the retina. In cataract the leus becomes opaque, and is no longer capable of transmitting the light. Its earliest approach is marked by a loss of the natural color of the pupil, and when developed it causes the



pupil to have a milk-white or pearly color. It is most common in old or elderly people, and is quite painless. Cataract is treated by different surgical operations, all of them consisting in removing the diseased lens from its situation opposite the transparent cornea. couching, the lens is depressed, removed downward, and kept from rising by the vitreous humor; but this method is now almost entirely given up in favor of removal of the lens by extraction. Extraction consists in making an incision in the cornea, and in the capsule of the lens, by which the lens may be brought forward, and through the cut in the cornea, so as to be altogether removed. The third opera-tion is by *absorption*. This consists in wounding the capsule, breaking down the crystalline, and bringing the fragments into the anterior chamber of the eye, where they are exposed to the action of the aqueous humor, and are at length absorbed and disappear. Extraction is now the regular method, and after it is effected a special kind of spectacles is required.

Cat'aract (or Waterfall), the leap of a stream over a ledge or precipice occurring in its course. Many cataracts are remarkable for their sublimity, the grandest being the Falls of Niagara, on the Niagara River between lakes Erie and Ontario, and between the U. S. and Canada, the river having there a fall of about 160 ft. Among other notable falls are those of the river Montmorency, a tributary of the St. Lawrence, which are 242 ft. in height; that of the river Potaro, in British Guiana, about 822 ft. high and 369 broad; that of the Yosemite River, California, which makes a perpendicular leap of 2,100 ft.; the Victoria Falls, on the river Zambezi, in South Africa, The about 370 ft. high and 1,860 yds. broad. cataract of the Riukanfoss, on the river Maan, in Norway, is about 900 ft. high. The cascade of Gavarnie, in the Pyrenees, is reputed the The loftiest in Europe, being about 13,000 ft. fall of the Staubbach at Lauterbrunnen, in Switzerland, is between 800 and 900 ft., but has also a very small volume of water; the falls of the Rhine at Schaffhausen, renowned over Europe, are 300 ft. broad and nearly 100 ft. in height. In Italy the Falls of Terni, on the Velino, and those of the Anio, at Tivoli, are artificial but very beautiful. Among British waterfalls, the falls of the Clyde, three in pumber, viz., Bonniton Linn, 30 ft., Corra Linn, 84 ft., and Stonebyres Linn, 80 ft., are remarkable for their beauty and grandeur.

**Catarrh** (kå-tär') (I flow down), an increased secretion of mucus from the membranes of the nose, fauces, and bronchi, accompanied with fever, and attended with sneezing, cough, thirst, lassitude, and want of appetite. There are two species of catarrh, one which is very common, and is called a *cold in the head*; and another, the influenza, or epidemic catarrh.

**Cataw' ba**, a river in North Carolina, giving its name to a light wine of rich Muscadine flavor, which has acquired some celebrity in the U. S., the grape from which it is made having been first discovered near its sources.

Cat Bird, a well-known species of American

thrush, which during the summer is found throughout the Middle and New England states, frequenting thickets and shrubberies. Its note is strikingly similar to the plaint of a kitten in distress. The plumage is a deep slate color above and lighter below, and it is about 9 in. in length. In habit it is lively, familiar, and unsuspicious: the song is largely imitative of those of other birds. During the winter it inhabits the extreme south of the U. S., and is found also in Mexico and Central America.

**Cateau-Cambrésis** (kä-tō-kán-brā-sis), a town, France, dep. Nord, famous for the treaty of its name signed here in 1559, by which Henri II of France gave up Calais to the English, and agreed to a mutual exchange with Spain of all conquered territories. It has various textile manufactures. Pop. 10,544.

Catechism, an elementary book containing a summary of principles in any science or art, but particularly in religion, reduced to the form of questions and answers. The first regular catechisms appear to have been compiled in the eighth and ninth centuries, those by Kero of St. Gall and Otfried of Weissenburg being most famous. Among Protestants the catechisms of Luther (1518, 1520, and 1529) acquired great celebrity, and continue to be used in Germany. The catechism of the Church of England in the first book of Edward VI, March 7, 1549, contained merely the baptismal vow, the creed, the ten commandments. and the Lord's prayer, with explanations, the part relative to the sacraments being subjoined at the revision of the liturgy during the reign The catechism of the Church of of James I. Scotland is that agreed upon by the Assembly of Divines at Westminster, with the assistance of commissioners from the Church of Scotland, and approved of by the General Assembly in the year 1648. What is called the Shorter Catechism is merely an abridgment of the Larger, and is the one in most common use. The best known catechism among Protestant Dissenters was that of Doctor Watts.

**Cat'egory** (or Predicament), in logic, an as-semblage of all the beings contained under any genus or kind ranged in order. The ancients, following Aristotle, held that all beings or objects of thought may be referred to ten categories, viz.: quantity, quality, relation, ac-tion, passion, time, place, situation, and habit. Plato admits only five: substance, identity, diversity, motion, and rest; the Stoics four: subjects. qualities, independent circumstances, relative circumstances. Descartes suggested seven divis-ions: spirit, matter, quantity, substance, figure, motion, and rest. Others make but two categories, substance and attribute, or subject and accident; or three, accident being divided into the inherent and circumstantial. In the philosophy of Kant the term categories is applied to the primitive conceptions originating in the understanding independently of all experience, though incapable of being realized in thought except in their application to experience. These he divides into four classes: quantity, quality. relation, and modality. J. S. Mill applies the term categories to the most general

heads under which everything that may be asserted of any subject may be arranged. Of these he makes five: existence, co-existence, sequence, causation, and resemblance, or, considering causation as a peculiar case of sequence, four.

**Cat'enary Curve,** that curve which is formed by a cord or chain of uniform density and thickness when allowed to hang freely between two points. It is of interest as bearing on the theory of arches and domes, and as the curve assumed by the chains of a supension bridge.

Caterpillar, the larval stage of butterflies and moths, and the representative in this special order of the grub, maggot, or larva phase in the life history of many insects. The caterpillar, so familiar in its external appearance, has usually 12 body rings, not including the head, is provided with strong biting jaws, strikingly contrasted with the mouth organs of the adult, has three pairs of five-jointed clawed legs on the region corresponding to the thorax, and usually five rudimentary stumps or pro-legs on the abdomen. These unjointed appendages are borne on the sixth to the ninth, and on the twelfth segments of the body; some of them may be absent; in the majority of cases they are adapted for clambering. The cases they are adapted for clambering. body may be naked or covered with hairs, bristles, and spines, which, in caterpillars living an exposed life, are usually brightly colored. The large head is divided by a median line, and bears six eye-spots on each side, a pair of short three-jointed feelers, strong upper jaws or mandibles, besides jointed palps onthe two successive pairs of mouth appendages. Two well-developed spinning organs open on the second pair of maxillæ forming the lower lip. On each side, on the first ring, and on the fourth to the eleventh, there are nine pairs of openings into the respiratory air tubes. The colors are familiarly bright in many instances. The surface is often beautifully marked longitudinally, or transversely, or with ring spots and eye spots. Odoriferous and other glands frequently occur on the skin, and are in some cases eversible. Most caterpillars lead an active life, some roving only at night, others also in the daytime. Their movements are guided by an appreciation of the force of gravitation; they usually crawl upward; and they always know their food-plant when they come to it. Their ravages among vegetables and other plants are only too well known. Some forms are carnivorous.

**Catfish**, a remarkably voracious fish, belonging to the family of gobies, the name common to several North American fish. Is known also as the *Horned Pout* and *Bullhead*. It is excellent eating.

**Cat'gut,** a cord made from the intestines of sheep, and sometimes from those of horse, ass, and mule, but not from those of cats. The manufacture is chiefly carried on in Italy and France by a tedious process. Catgut for stringed instruments, as violins and harps, is made mostly in Milan and Naples, the latter having a high reputation for treble strings. **Catharine I,** Empress of all the Russias (1684-1727). She was the daughter of poor parents, who died when she was three years old. In 1701 she married a dragoon of the garrison of Marienburg. The town was taken by the Russians in 1702, and C. was sent with others to Moscow, where she first saw Peter the Great. She now dropped her real name, Martha Rabe, was baptzied in the Greek Church, and took the name of Jékatérina Alexélevna. Peter married her in 1711. She was afterward crowned at Moscow, 1724; and on her husband's death she became empress.

Catharine II (1729-1796), Empress of Russia. In 1745 she was married to Peter, nephew and successor of the Russian Empress Elizabeth. on whose death in 1762 her husband succeeded as Peter III. In danger of being supplanted by the Countess Woronzoff, Catharine, with the assistance of her lover, Gregory Orloff, and others, won over the guards and was pro-claimed monarch (July, 1762). On the death of Augustus III of Poland she caused her old favorite, Poniatowski, to be placed on the throne with a view to the extension of her influence in Poland, by which she profited in the partition of that country in the successive dismemberments of 1772, 1793, and 1795. By the war with the Turks, which occupied a considerable part of her reign, she conquered the Crimea and opened the Black Sea to the Russian navy. Her dream, however, of driving the Turks from Europe and restoring the Byzantine Empire was not to be fulfilled. Her relations with Poland and with other European powers induced her to make peace with Turkey in 1792. She appears to have been successful in improving the administration of justice, ameliorated the condition of the serfs, constructed canals, founded the Russian Academy, and in a variety of ways contributed to the enlightenment and prosperity of the country. Her enthusiasm for reform, however, was summarily checked by the events of the French Revolution; and the dissipation and extravagance of her court were such that there was even a danger of its exhausting the empire. Of her many advisers Potemkin was longest in favor, retaining his influence from 1775 till his death in 1791, directing Russian politics throughout that period in all essential matters. Catharine de Medici (dā-med'i-chē) (1519-

1589), wife of Henry II, king of France, the only daughter of Lorenzo de Medici, duke of Urbino, and the niece of Pope Clement VII. She was married to the duke of Orleans, afterward Henry II, in 1533. The death of Francis placed the reins of government, during the minority of her son Charles IX, in her hands. Wavering between the Guises, who had put themselves at the head of the Catholics, and Condé and Coligny, who had become very powerful by the aid of the Protestants, she played off one faction against the other in the hope of increasing her own power; and the thirty years of civil war which followed were mainly due to her. Her influence with Charles IX was of the worst kind, and the massacre of St. Bartholomew's Day was largely her work.

**Catharine Howard** (1522-1542), queen of England, fifth wife of Henry VIII, daughter of Lord Edmund Howard, son of the duke of Norfolk. Her beauty and vivacity induced the king to marry her in 1540, but her conduct appears to have been of a dubious kind both before and after marriage, and in 1542 she was executed for impropriety of conduct.

was executed for impropriety of conduct. **Catharine of Aragon** (1485-1536), queen of England, the youngest daughter of Ferdinand of Aragon and Isabella of Castile. In 1501 she was married to Arthur, prince of Wales, son of Henry VII. Her husband dying about five months after, the king unwilling to return her dowry, caused her to be contracted to his remaining son, Henry, and a dispensation was procured from the pope for that purpose. On his accession to the throne as Henry VIII in 1509 she was crowned with him, and despite the inequality of their ages retained her ascendency with the king for nearly twenty years. Her children, however, all died in infancy, excepting Mary, and on the advent of Anne Boleyn, Henry affected to doubt the legality of his union with Catharine.

**Catherine Parr** (1512-1548), sixth and last wife of Henry VIII of England, had had two husbands before she became Henry's queen in 1543. After the death of the king, she espoused the lord admiral, Lord Thomas Seymour, uncle to Edward VI; but the union was an unhappy one.

Cathe' dral, the principal church of a diocese, so called from its possessing the episcopal chair or cathedra. This is really what distinguishes a cathedral from other churches, though most cathedrals are also larger and more elaborate structures than ordinary churches, and have various dignitaries and functionaries connected with them. As regards architecture cathedrals naturally vary much. Those in England are almost all in the Gothic style, cruciform or cross-shaped in arrangement, and having connected with them a chapter house, side chapels (varying in number and position), cloisters, crypt, etc. This style and arrangement are also common on the continent of Europe, and in most modern cathedrals; but the Romanesque, Renaissance, and Byzantine styles of architecture are also employed. Many cathedrals furnish the most magnificent examples of the architecture of the Middle Ages. Among the most noted cathedrals are St. Peter's, the largest of all, founded 1450; the cathedral at Milan, founded in 1386, built of white marble; the cathedral at Florence, begun about 1294, one of the finest specimens of the Italian-Gothic style; Cologne cathedral, commenced in 1248 (and only finished recently); Notre Dame, at Paris, begun 1163; and those of Amiens, Chartres, and Rheims. The most noteworthy English cathedrais are St. Paul's, London (1675-1711), in the Renaissance style, and those of Canterbury, Ely, Exeter, Lichfield, Lincoln, Norwich, Salisbury, Wells, Westminster, and York. The cathedrals of Glasgow and Kirkwall are the only entire cathedrals in Scotland, exclusive of modern edifices.

**Cathetom 'eter**, an instrument for measuring small differences of level between two points; in its simplest form, a vertical graduated rod upon which slides a horizontal telescope. With the telescope the observer sights the two objects under examination, and the distance on the graduated rod moved over by the telescope is the measure of the distance of height between the two objects.

Catholic Church.-The term catholic literally signifies "universal." The phrase Catholic Church is therefore equivalent to "universal church," and cannot properly be applied to any particular sect or body, such as the Roman, Anglican, Genevan, Reformed, Lutheran, or Presbyterian, all of which form merely portions more or less pure of the "church universal." It occurs for the first time in the pseudo-Ignatian Epistle to the Smyrnaans. It was first employed from about 160 A. D. to mark the difference between the orthodox "univer-" Christian church and the various sects of sal the Gnostic heretics; though, afterward, it served also to distinguish the all-embracing Christian church from the religious exclusiveness of the pre-Christian ages, in which the church was restricted to a single nation.

Cat'iline(Lucius Sergius Catilina) (B.C. 108-62), a Roman conspirator, of patrician rank. In his youth he attached himself to the party of Sulla, but his physical strength, passionate nature, and unscrupulous daring soon gained him an independent reputation. He was elected prætor in B.C. 68, and governor of Africa in 67. In B.C. 66 he returned to Rome to contest the consulship, but was disqualified by an impeachment for maladministration in his province. Urged on by his necessities as well as his ambition, he entered into a conspiracy with other disaffected nobles. The plot, however. was revealed to Cicero, and measures were at once taken to defeat it. Thwarted by Cicerc at every turn, and driven from the senate by the orator's bold denunciations, Catiline fled, and put himself at the head of a large but illarmed following. The news of the suppression of the conspiracy and execution of the ringleaders at Rome diminished his forces, and he led the rest toward Gaul. Metellus Celer threw himself between the rebels and their goal, while Antonius pressed upon their rear, and, driven to bay, Catiline turned upon the pursuing army and perished fighting. **Catinat** (ka-ti-nä), NICHOLAS (1637-1712), marshal of France. He attracted the notice

**Catinat** (ká-ti-nä), NICHOLAS (1637-1712), marshal of France. He attracted the notice of Louis XIV at the storming of Lille (1667). and by his conduct, especially at the battle of Senef, gained the friendship of Condé. He was sent as lieutenant general against the Duke of Savoy, gained the battles of Staffardo (1690), and Marsaglia (1693), occupied Savoy and part of Piedmont, and was made marshal in 1693. In Flanders he displayed the same activity, and took Ath in 1697. In 1701 he received the command of the army of Italy against Prince Eugene; but his ill-furnished forces were defeated at Carpi, and he was disgraced,

Cat Island, one of the Bahama Islands,

about 46 mi. in length from n. to s., and 3 to 7 in its mean breadth. Pop. 3,000. It was long thought that it was the Guanahani, or San Salvador, where Columbus first touched the New World in 1492.

**Catlin**, GEORGE (1796-1872), the delineator of the Indians. After practising as a lawyer for two years, he set up at New York as a portrait painter, and in 1832 commenced special studies of Indian types, residing many years among them both in North and South America. His finely-illustrated works are: Manners, Customs, and Condition of the North American Indians; North American Portfolio; Eight Years' Tratel in Europe; Last Rambles among the Indians; etc.

**Catimint** (or catnip), a plant of the natural order Labiatæ, widely diffused throughout North America, Europe, etc. It grows erect to a height of 2 or 3 ft., has whorls of rosetinged, whitish flowers, and stalked, downy, heart-shaped leaves. It has much the same fascination for cats as valerian root.

**Cato**, DIONYSIUS, the reputed author of the small collection of moral apophthegms known as *Catonis Disticha de Moribus ad Filium*. Nothing is known of him; but the work, which is apparently in large part a genuine classic, had a high reputation in the Middle Ages.

Cato, MARCUS PORCIUS, the Censor (B.C. 234-149), surnamed Priscus also Sapiens, and Major (the Wise, and the Elder), a celebrated Roman. He inherited from his father, a plebeian, a small estate in the territory of the Sabines. He served his first campaign, at the age of seventeen, under Fabius Maximus, was present at the siege of Capua in 214 B. C.; and five years after fought under the same commander at the siege at Tarentum. After the war was ended, he returned to his farm, but by the advice of Valerius Flaccus removed to Rome, where his forensic abilities had free scope. He rose rapidly, accompanied Scipio to Sicily as quæstor, became an ædile, and in 198 was chosen prætor, and appointed to the province of Sardinia. Three years later he gained the consulship, and in 194 for his brilliant campaign in Spain obtained the honor of a triumph. In 191 he served as military tribune against Antiochus, and then returned to Rome. For some years he exercised a practical censorship, scrutinizing the characters of candidates for office, and denouncing false claims, peculations, etc. His election to the censorship in 184 set an official seal to his efforts, the unsparing severity of which has made his name proverbial. From that year until his death, he held no public office, though zealously continuing his unofficial labors for the state. Cato, MARCUS PORCIUS (B.C. 95-46) (called Cato of Utica, the place of his death, to distinguish him from the censor, his great-grand-father), a distinguished Roman. He formed an intimacy with the Stoic Antipater of Tyre, and ever remained true to the principles of the Stoic philosophy. He distinguished him-self as a volunteer in the war against Sparta-

cus, served as military tribune in Macedonia

in B.C. 67, was made quæstor in B. c. 65. His rigorous reforms won him general respect, and in B.C. 63 he was chosen tribune of the people. During the troubles with Catiline Cato gave Cicero important aid both by his eloquence and sagacity, and at the same time set himself to thwart the ambitious projects of Pompey, Cæsar, and Crassus. To get rid of him they sent him to take possession of Cyprus, but, having successfully accomplished his mission, he returned, opposed the Tribonian law for conferring extraordinary powers on the triumvirs, and in 54 B.C. enforced as prætor, an obnoxious law against bribery. On the breach between Pompey and Cæsar he threw in his lot with Pompey, and guarded the stores at Dyrrhachium, while Pompey pushed on to Pharsalia. After receiving news of Pompey's defeat he sailed to Cyrene and effected a junction with Metellus Scipio at Utica, in B.c. 47. He took command of that city, but its defense appearing hopeless after the defeat of Scipio at Thapsus, he determined on suicide, and after spending some time in the perusal of the Phædo of Plato, stabbed himself with his sword.

**Cat's-eye**, a mineral, a variety of quartz, very hard and semitransparent, and from certain points exhibiting a yellow opalescent radiation or *chatoyant* appearance resembling a cat's eye.

**Catskill**, Greene co., N. Y., on Hudson River, 36 mi. s. of Albany. Railroads: Central Hudson; N. Y. W. S. & B.; and Catskill Mts. & Cairo. Industries: vitrified paving brick, iron foundry, two knitting mills, sash and door factory, brickyards, electric light and gas plants. Surrounding country agricultural. The village was first settled about 1650 by the Dutch. Pop. est. 1897, 5,400.

**Catskill Mountains,** a fine range of mountains in New York state. They lie on the west side of and nearly parallel to the Hudson, from which their base is, at the nearest point, 8 mi. distant. The two most elevated peaks are Round Top and High Peak: the former 3,804 ft., the latter 3,718 ft. high. The Dunderberg is the scene of Washington Irving's inimitable *Rip Van Winkle*.

**Čat'tegat**, a large gulf of the North Sea, between Denmark and Sweden. It is noted for its herring fishery.

**Cattle**, a term applied collectively to the larger domestic quadrupeds, and often exclu-



Shorthorn Bull and Cow. sively to those of the ox genus. The cattle of the U. S. and Canada present almost endless

## Cattle

variety of form and character. They are descended from importations of cattle from Spain, Holland, Sweden, Denmark, France, and England, Scotland, and Ireland. About the year 1525, some six years after the discovery of Mexico by the Spaniard Cortez, cattle were introduced into that country from Spain, and in the abundant pasturage of the Mexican territory they increased rapidly, spreading with the enterprising Spanish settlers into Texas, California, and other parts of the far



Hereford Bull and Cow.

West. Exactly 100 years later the Dutch settlers in New York brought cattle thither from Holland, and a few years earlier small importations of cattle had been made from the West India Islands into Virginia. The earliest of these arrivals in Virginia are assigned to 1610 and 1611, but that colony was broken up in 1622 by the Indians, who massacred 347 men, women, and children, and, it is presumed, also destroyed their cattle. In 1624—four years after the landing of the English Plymouth colony there—cattle were introduced into Massachusetts from England, and many other importations followed during the next few years. The Swedes brought cattle into Delaware in 1627, and in 1631 the two following years Danish emigrants introduced cattle from their enative country into New Hampshire. English emigrants settled in Maryland in 1633, in



Galloway Bull.

Jersey Cow.

North and South Carolina in 1660 and 1670, and in Pennsylvania in 1682, and took with them, or had sent after them, large numbers of English cattle. The French colonists brought cattle into Quebec as early as 1608; and toward the close of the seventeenth century fresh importations of European cattle poured into the great American continent. There is no authentic information as to the character of the cattle first introduced into America, but all the leading breeds of the British Isles, as well as the chief milking breeds of the European continent, are now strongly repre-

## **Caudine Forks**

sented in North America: Hereford, Polled Aberdeen, Angus, Galloway, Devon, Norfolk and Suffolk Red Polls, Jersey, and Dutch breeds. The Texan cattle still retain the rough, coarse character which distinguished their Spanish ancestors. Improvement among the Texan cattle is proceeding very slowly.

the Texan cattle is proceeding very slowly. **Catul'ius**, CAIUS (or QUINTUS) VALERIUS. (B. C. 94-54), a famous Roman lyric poet. Almost all the known details of his life are derived by inference from his works, and relate to such matters as his passion for Lesbia, his journey to Bithynia, and voyage home in his yacht, his pleasant villa on Lake Benacus, etc. He was the first of the Romans who successfully caught the Greek lyric spirit, and gave to Roman literature its most genuine songs.

**Cauca**, (kou'kå), a S. A. river in Colombia, an important tributary of the Magdalena: length 600 to 700 mi. It gives its name to a department or state of Colombia; area 52,000 sq. mi.; pop. 450.000. **Caucasian Race**, a term introduced into eth-

**Caucasian Race**, a term introduced into ethnology by Blumenbach, in whose classification of mankind it was applied to one of the five great races into which all the different nations of the world were divided. Blumenbach believed this to be the original race from which the others were derived, and he gave it the epithet of Caucasian because he believed that its most typical form—which was also that of man in his highest physical perfection—was to be met with among the mountaincers of the Caucasus. In later classifications this "race" is usually divided into Aryan or Indo-European, and Semitic. Most of the tribes inhabiting the Caucasus belong to the Turanian class.

**Cau'casus**, a chain of mountains which gives name to a lieutenancy under Russian government lying to the southeast of Russia proper, between the Black Sea and the Caspian. The total area of the lieutenancy is 179,527 sq. mi. and the pop. about 5,500,000. The Causasus chain of mountains traverses the lieutenancy from northwest to southeast through a length of 700 miles. The heights of the chief summits are Elbruz, 18,572 ft; Koshtan-tau, 17,123; Dych-tau, 16,928; Kasbek, 16,-540.

**Caucus**, a term, originally American, for a private meeting of citizens to agree upon candidates to be proposed for election to offices or to concert measures for supporting a party. Its origin is referred to a fray between some British soldiers and Boston rope makers in 1770, which resulted in democratic meetings of rope makers and caukers, called by the Tories caucus meetings.

**Cau dex,** in botany, the stem of a tree, more especially the scaly trunk of palms and tree ferns. It often appears as a rhizome running along the surface of the earth or underground.

**Caudine Forks,** a pass of Southern Italy, in the form of two lofty fork-shaped defiles, in the Apennines (now called the valley of Arpaia), into which a Roman army was enticed by the Samnites, B.C. 321, and being hemmed in was forced to surrender.



**Cau' liflower**, a garden variety of cabbage, in which cultivation has caused the inflorescence to assume when young the form of a compact, fleshy head, which is highly esteemed as a table vegetable. Broccoli is much the same.

**Caulking** (kgk'ing), of a ship, driving a quantity of oakum into the seams of the planks in the ship's decks or sides in order to prevent the entrance of water. After the oakum is driven very hard into these seams it is covered with hot melted pitch to keep the water from rotting it.

**Cause**, that which produces an effect: that from which anything proceeds and without which it would not exist. In the system of Aristotle the word rendered cause and its equivalents in modern language has a most extensive signification. He divides causes into four kinds: efficient, formal, material, and final. The efficient or first cause is the force or agency by which a result is produced: the formal, the means or instrument by which it is produced; the material, the substance from which it is produced: the final, the purpose or end for which it is produced. In a general sense the term is used for the reason or motive that urges, moves, or impels the mind to act or decide.

**Caustic**, a name given to substances which have the property of burning, corroding, or disintegrating animal matter; or of combining with the principles of organized substances and destroying their texture. Lunar Caustic, a name given to nitrate of silver when cast into sticks for the use of surgeons, etc. Caustic potash, the hydrate of potassium. Caustic soda, protoxide of sodium.

**Caustic,** in optics, the name given to the curve to which the rays of light, reflected or refracted by another curve are tangents. Caustics are consequently of two kinds—*catacaustics* and *diacaustics*—the former being caustics by reflection and the latter caustics by refraction.

**Cavaller** (ka-va-lēr'), a horseman, especially an armed horseman: applied in history to the partisans of Charles I. of England, as opposed to Roundheads, the adherents to the Parliament.

Cav'alry, a body of troops which serve on horseback, one of the three great classes of troops, and a formidable power when properly employed. Its adaptation to speedy movements is a great advantage, which enables a commander to avail himself immediately of a decisive moment, when the enemy exposes a weak point, or when disorder appears in his ranks. It is very serviceable in protecting the wings and center of an army, for escorts, for blockading, for intercepting the supplies of the enemy, for procuring intelligence, for covering a retreat, for foraging, etc. Cavalry are usually armed with sabers, pistols, and car-bines. The total of the ten regiments of cavalry in the U.S. regular army is 9,360; each regiment comprising twelve troops, of 78 privates each.

**Cav'an**, an inland Irish county in Ulster; area 477,390 acres, of which three fourths are

arable. Oats, flax, and potatoes are the chief crops. The principal towns are Cavan, Cootehill, and Belturbet. Pop. 111,917. CAVAN, the county town, 57 mi. n.w. Dublin, has a considerable trade in farm produce. Pop. 2,968.

Cave (or Cavern), an opening of some size in the solid crust of the earth beneath the surface. Caves are principally met with in limestone rocks, sometimes in sandstone, and in volcanic rocks. Some of them have a very grand or picturesque appearance, such as the Mammoth Cave of Kentucky, which encloses an extent of about 40 mi. of subterranean windings, and is celebrated for its great size and subterranean waters. Caves in which the bones of extinct animals are found owe their origin, for the most part, to the action of rainwater on limestone rocks. The deposit contained in them usually consists of clay, sand, and gravel combined. In this are embedded the animal remains, and stones either angular or rounded. Some of the remains found in European caverns belong to animals now found only in the tropical or subtropical regions, and others are the remains of animals now living in more northerly areas: others, again, are the relics of extinct animals. Among the latter class of animals are the cave bear and lion, the mammoth and mastodon, species of rhinoceros. etc. Of others that have only migrated may be mentioned the reindeer, which is no longer found in Southern Europe: and the Hyana crocuta, found in the Gibraltar caves, which now lives in South Africa. The ibex, the chamois, and a species of ground squirrel, are shown to have once lived in the Dordogne, but are now found only on the heights of the Alps and Pyrenees. Thus it is evident that the geographical conditions of the country must have been very different from what they are now. Man's relation to these extinct animals. and his existence at the time these changes took place, are demonstrated by such discoveries as those of human bones and worked flints beneath layers of hyena droppings, as in Wokey's Hole, near Wells, England: mixed up indiscriminately, as in Kent's Hole, near Torquay, with bones of elephant, rhinoceros, hyena, etc.; and by the fact that many bones of the extinct animals are splitup, evidently for the sake of the marrow. In the Dordogne and Savigné caves fragments of horn have been found bearing carved, or rather deeply scratched, outline figures of ibex, reindeer, and mammoth.

**Cave Men,** prehistoric races who lived in caves. That they were at a low state of civilization, though possessed of some artistic faculty, is evidenced by the fact that they were ignorant of the metals, of pottery, and of agriculture, and had no domestic animals.

**Cav'endish**, tobacco which has been softened and pressed into quadrangular cakes, so called from Thomas Cavendish, the Elizabethan circumnavigator.

**Cav'endish,** LORD FREDERICK (1836-1882). English statesman, a younger son of the seventh duke of Devonshire. He sat in the House of 31
# Cavendish

Commons as a Liberal for a Yorkshire district from 1865 until the spring of 1882, when he succeeded W. E. Forster as chief secretary of Ireland. On May 6 he reached Dublin, and on that evening he and Mr. Burke, a subordinate government official, were stabbed to death in Phomix park by "Invincibles."

death in Phonix park by "Invincibles." **Cav'endish**, HENRY (1731-1800), English physicist and chemist. He devoted himself exclusively to science, and greatly contributed to the progress of chemistry, having discovered the peculiar properties of hydrogen, the composition of water, etc. He also wrote on electricity, and determined the mean density of the earth.

**Cavendish** (or Candish), THOMAS (1555-1592), an English circumnavigator in the reign of Elizabeth. Having collected three small vessels for the purpose of making a predatory voyage to the Spanish colonies, he sailed from Plymouth in 1586; took and destroyed many vessels, ravaged the coasts of Chile. Peru, and New Spain, and returned by the Cape of Good Hope, having circumnavigated the globe in two years and forty-nine days, the shortest period in which it had been effected. In 1591 he set sail on a similar expedition, during which he died.

**Cavendish College.** Cambridge, England, founded by the Duke of Devonshire in 1876 for the purpose of giving cheap university education to youths younger than those admitted to other colleges, and leaving earlier.

**Caviare** (kav'i-ār), the roes of certain large fish prepared and salted. The best is made from the roes of the sterlet and sturgeon, caught in the rivers or lakes of Russia.

**Cavite** (ka-vě'tā), a town in the island of Luzon, one of the Philippines. Its docks and arsenal were once famous. It gives name to a province with a pop. of 57,000. Pop. of town about 7,000.

Cavour (kå-vör'), Count Camillo Benso di (1809–1861), a distinguished Italian statesman. He was educated in the military academy at Turin, and after completing his studies he made a journey to England, where he re-mained for several years, making himself acquainted with the principles and working of the British constitution, and forming friendships with some of the most distinguished men. He became a member of the Sardinian Chamber of Deputies in 1849, and the following year minister of commerce and agriculture. In 1852 he became premier, and not long afterward took an active part in cementing an alliance with Great Britain and France, and making common cause with these powers against Russia during the Crimean War. In 1860 Garibaldi's expedition to Sicily took place, but toward this and the subsequent movements of the Italian liberator Count Cavour was forced to maintain an apparent coldness. He lived to see the meeting of the first Italian parliament, which decreed Victor Emmanuel king of Italy.

**Cawnpore**', a town, India, Northwest Provinces. It has manufactures of leather and cotton goods and a large trade. Pop. 188,712. In 1857 the native regiments stationed there mu-

### Caxton

tinied and marched off, placing themselves under the command of the rajah of Bithoor, the notorious Nana Sahib. General Wheeler, the commander of the European forces, defended his position for some days, but was at length induced to surrender on condition of his party being allowed to quit the place uninjured. This was agreed to; but after the Europeans had embarked on the Ganges, they were fired on by the rebels; many were killed, and the remainder conveyed back to the city, where the



### Carpet Loom, Cawnpore.

men were massacred, and the women and children placed in confinement. The approach of General Havelock to Cawnpore roused the brutal instincts of the Nana, and he ordered his prisoners to be slaughtered, and their bodies to be thrown into a well. The following day he was obliged, by the progress of Havelock, to retreat to Bithoor. A memorial has since been erected over the scene of his atrocities, and public gardens now surround the well.

**Caxamarca** (or Cajamarca) (kå-kå-mår'kå), a department and town, Peru; area of the department about 14,200 sq. mi.; pop. 213,400. The town is situated about 70 mi. from the Pacific Ocean, 280 n. of Lima. Pop.18,400. It was the scene of the imprisonment and murder of Atahualpa, the last of the Incas.

**Caxlas**, a town of Brazil, province Maranhão, on the Itapicuru, which is here navigable. Pop. 13,680.

**Caxton**, WILLIAM (1422-1491), the introducer of the art of printing into Britain. He served an apprenticeship to Robert Large, a London mercer. On the death of his master, Caxton went into business for himself at Bruges. He was afterward appointed governor at Bruges to the London Association of Adventurers. He had translated the popular mediæval romance *Collection of the Histories of Trog*, and in order to multiply copies he learned the newly discovered art of printing. It was printed either at Cologne or Bruges about

### Cayenne

1474, and is the earliest specimen of typography in the English language. He translated twenty-one books, mainly romances, from the French, and one from the Dutch, helping materially to fix the literary language of the sixteenth century. He was buried in the church of St. Margaret's, Westminster.

**Cayenne** (ki-en'), the capital of the colony of French Guiana, is a seaport on an island of the same name at the mouth of the Cayenne River. It is a noted penal settlement, has a large but shallow harbor. Pop. 10,870.

**Cayman Islands**, three islands situated about 140 mi. n.w. of Jamaica, of which they are dependencies. Grand Cayman, the largest and the only one inhabited, is 20 mi. long and from 7 to 10 broad, and has two towns or villages. The inhabitants, about 2.500 in number, partly descendants of the buccaneers, are chiefly employed in catching turtle. The other two islands are Little Cayman and Cayman Brac. Pop. 400.

**Cayu ga Lake**, a lake in the state of New York, 38 mi. long and from 1 to 34 mi. wide. It is much frequented by pleasure parties.

**Ceará** (sā-á-rä'), a province on the north coast of Brazil; area 40,255 sq. mi. Among its productions are numerous medicinal plants, gums, balsams, and resins; cotton, coffee, sugar cane, etc., are cultivated. The first Portuguese colony in Ceará was founded in 1610, in the neighborhood of Ceará, the present capital. This town is situated on the coast, and carries on a considerable trade in rubber, coffee, sugar, etc. Pop. of prov. 956,724; of town of Ceará, 33,280.

**Cebu** (thā-bö'), one of the Philippine Islands, lying between Luzon and Mindanao. Sugar cultivation and the manufacture of abaca are the chief industries. Pop. 320,000. The town of Cebu, on the eastern coast of the island, the oldest Spanish settlement on the Philippines, is a place of considerable trade, and has a cathedral and several churches.

**Cecil**, the family name of the Salisbury family of English nobility. In addition to the present Marquis of Salisbury the family has produced several noted statesmen of whom Robert Cecil (1503-1612) and William Cecil (1520-1598) were the most celebrated.

**Cecil** ia, SAINT, the patron saint of music, who has been falsely regarded as the inventress of the organ, and who is said to have suffered martyrdom A. D. 230, although other dates are given. In the Roman Catholic Church her festival (November 22) is made the occasion of splendid music. Her story forms one of Chaucer's *Canterbury Tales*, and Dryden in his *Alexander's Feast*, and Pope in his *Ode on St. Cecilia's Day*, have sung her praises. Raphael. Domenichino, Dolce, and Mignard, have represented her in celebrated paintings.

**Cecro'pia**, a genus of beautiful South American trees, of the bread-fruit order. One of these, the trumpet-wood, is remarkable for its hollow stem and branches, the former being made by the Indians into a kind of drum and the latter into wind instruments. The light porous wood is used by the Indians for procuring fire by friction. The inner bark is fibrous and strong, and used for cordage. This species yields caoutchouc.

Ce'dar, a tree which forms fine woods on the mountains of Syria and Asia Minor. It is an evergreen, grows to a great size, and is remarkable for its durability. Of the famous cedars of Lebanon comparatively few now remain, and the tree does not grow in any other part of Palestine. The most celebrated group is situated not far from the village of Tripoli, at an elevation of about 6,000 ft. above the sea. The circumference of the 12 largest trees here varies from about 18 to 47 ft. Cedar timber was formerly much prized, but in modern times is not regarded as of much value, perhaps from the trees not being of suf-



#### Oedars of Lebanon.

The name is given also to the ficient age. deodar, which is indeed regarded by many botanists as a mere variety of the cedar of Lebanon, and which produces excellent timber. It is a native of India, and is a large and handsome tree, growing in the Himalayas to the height of 150 ft., with a circumference of 30. It has wide-spreading branches, which droop a little at the extremities. The leaves are tufted or solitary, larger than those of the cedar of Lebanon and very numerous, of a dark bluish green, and covered with a glaucous bloom. The cones are rather larger than those of the Lebanon cedar, and very 'resinous. The wood is well adapted for building purposes. The Mount Atlas cedar, as its name implies, is a native of the mountains of North Africa. This cedar, though differing in habit and minor features, is regarded by some botanists as specifically identical with the other two. The name is also applied to many trees which. have no relation to the true cedar, as the Ber-



muda cedar, used for making pencils, the red cedar, the Honduras, or bastard Barbadoes cedar and the red cedar of Australia.

**Cedar Creek**, a stream in Shenandoah co., Va., near which General Sheridan converted a defeat of the Federals by the Confederates into a complete victory, October, 1864.

**Cedar Lake**, a lake in Canada, an expansion of the Saskatchewan before it enters Lake Winnipeg; nearly 30 mi. long, and where widest 25 mi. broad.

Cedar Rapids, Linn co., Ia., on Cedar River, 219 mi. w. of Chicago. Surrounding country agricultural. Railroads: C. & N. W.; B. C. R. & N.; and D. & S. W. It has good water power, a number of mills and manufactories, and several pork-packing establishments. Pop. est. 1807, 10.500.

Celebes (sel'e-bez), one of the larger islands of the Indian Archipelago, between Borneo on the west and the Moluccas on the east. Gold is found in all the valleys of the north penin-. sula, which abounds in sulphur. Copper occurs at various points, and in Macassar, tin also. Diamonds and other precious stones are found. The maritime districts are inhabited by Malays; the Peninsula of Macassar is occupied by Bugis Mandhars dwell in the west of and Macassars. the island, and the mountainous regions in the interior, especially in the north, are inhabited by Alfoories. The inhabitants may be classed into two groups, the Mohammedan semicivilized tribes, and the pagans, who are more or less savages. The capital is Macassar, in the southwest of the island. The trade in trepang is very important, Macassar being the chief staple place for this article of commerce. Celebes was first visited by the Portuguese in 1512, but no factory was established by them there till a few years later. In 1660 Macassar was taken by the Dutch, the southern portion of the island put under Dutch rule, and the Portuguese expelled. In 1683 the northern part likewise fell into their hands. The island was conquered by the British in 1811, but a few years later it was again given up to the Dutch in whose possession it has remained ever since. Pop. est. at 1,154,000.

**Cel'ery**, an umbelliferous plant indigenous in the temperate parts of Europe. In its native state it has the character of being a poisonous plant, but transplanted to a garden it becomes a wholesome vegetable. It is much cultivated in the U. S., principally two varieties, red and white stalked, and of these many sub-varieties. Celery is commonly blanched by heaping up the soil about the plants.

**Celestine**, the name of five popes of Rome (422-1296).

Cel'ibacy, the state of being celebate or unmarried; especially applied to the voluntary life of abstinence from marriage followed by many religious devotees and by some orders of clergy, as those of the Catholic Church. The ancient Egyptian priests preserved a rigid chastity; the priestesses of ancient Greece and Rome were pledged to perpetual virginity; and celibacy is the rule with the Buddhist priests of the East. Among Christians the earliest aspirants to the spiritual perfection supposed to be attainable through celibacy were not ecclesiastics as such, but hermits and anchorites who aimed at superior sanctity.

Cell, a term of various applications. 1, Ecclesiastically it was sometimes applied to a lesser or subordinate religious house, dependent upon a greater. The apartments or private dormitories of monks and nuns are also called cells. The term cell is applied also to the part of the interior of a temple where the image of a god stood. 2, In electricity, the term is applied to a single jar, bath, or division of a compound vessel, containing a couple of plates, generally copper and zinc, united to their opposites or to each other, usually by a wire. 3, In biology, a cell is a microscopically small semi-fluid portion of matter, consisting of a soft mass of living, contractile, jelly-like matter, and a central structure consisting of a small, roundish body, called the nucleus. generally more solid than the rest of the cell, and which may have within it a still more minute body, the nucleolus. The cell substance or protoplasm which surrounds the nucleus is an albuminous substance possessing fundamental vital properties, and believed to be the starting point of all animal and vegetable organisms. The cell wall when present consists of an alteration of the external portion of the cell body. and is not a separate structure.

**Cellini** (chel-lē'nē), BENVENU'TO (1500-1571), a sculptor, engraver, and goldsmith. At the siege of Rome he killed the constable of Bourbon and the Prince of Orange. He was afterward imprisoned on the charge of having stolen the jewels of the papal crown, and with difficulty escaped execution. He then visited the court of Francis I of France. He afterward returned to Florence, and under the patronage of Cosmo de Medici made a Perseus with the head of Medusa in bronze, which is still an ornament of one of the public squares: also a statue of Christ, in the chapel of the Pitti Palace, besides many excellent dies for coins and medals.

**Cellular Tissue**, in physiology, a name for what is also called the *areolar tissue*. In botany, the term is applied to the soft substance of plants, composed of elementary vesicles or cells without woody or vascular tissues.

**Cell'uloid**, an artificial substance extensively used as a substitute for ivory, bone, hard rubber, coral, etc., having a close resemblance to these substances in hardness, elasticity, and texture. It is composed of cellulose or vegetable fibrine reduced by acids to pyroxyline; camphor is then added and the compound molded by heat and pressure to the desired shape. It is used chiefly for buttons, handles for knives, forks, and umbrellas, billiard balls, backs to brushes, piano keys, napkin rings, opera-glass frames, etc. It can be variously colored.

**Cell'ulose**, the substance of which the permanent cell membranes of plants are always composed. It is closely allied to sugar, dextrin, or gum and starch, and is changed into the latter by heat, sulphuric acid, or caustic potash.

**Cel'sius,** the name of a Swedish family, several members of which attained celebrity in science and literature. The best known is Anders Celsius (1701-1744). After being appointed professor of astronomy at the University of Upsala he traveled in Germany, England, France, and Italy; and in 1736 he took part in the expedition of Maupertuis and others for the purpose of measuring a degree of the meridian in Lapland. He is best known as the constructor of the Centigrade thermometer.

**Celsius Scale**, another name for the Centigrade thermometric scale, from that of the inventor, Ander Celsius.

Celts, the earliest Aryan settlers in Europe according to the common theory. They appear to have been driven westward by succeeding waves of Teutons, Slavonians, and others. Herodotus mentions them as mixing with the Iberians who dwelt round the river Ebro, in Spain. At the beginning of the historic period they were the predominant race in Britain. Ireland, France, Belgium, Switzerland, North Italy, Spain, and elsewhere. The Romans called them generally Galli, that is, Gauls or Gael. They appear to have reached the zenith of their power in the second and third centuries B. c. Some tribes of them, overrunning Greece, settled in a part of Asia Minor, to which the name of Galatia was given. They finally went down before the resistless power of Rome, and either became absorbed with the conquering races or were cooped up in the extreme northwest of Europe. At an early date the Celts divided into two great branches, speaking dialects widely differing from each other, but doubtless belonging to the same stock. One of these branches is the Gadhelic or Gaelic, represented by the Highlanders of Scotland, the Celtic Irish, and the Manx: the other is the Cymric, represented by the Welsh, the inhabitants of Cornwall, and those of Brittany. The sun was the principal object of worship among the Celts. All the old Celts seem to have possessed a kind of literary order called Bards.

Celts, the name given to certain prehistoric weapons or other implements of stone or bronze which have been found over nearly the whole surface of the earth. Stone celts are found in the form of hatchets, adzes, chisels, etc. They vary in size from I in. to 2 ft. in length. The breadth is usually about  $\frac{1}{2}$  or  $\frac{1}{2}$  of the length. The materials of which they are made are flint, chert, clay slate, porphyry, various kinds of greenstone, and of metamorphic rocks, and, in short, any very hard and durable stone. Bronze celts belong to a later period than stone ones, and are not so numerous. Some stone celts, however, have been found along with bronze celts in such a manner as to show that stone celts were still used when the method of working bronze had been discovered.

**Cementa' tion**, the conversion of iron into steel by heating the iron in a mass of ground charcoal, and thus causing it to absorb a certain quantity of the charcoal.

Cements', the general name of glutinous or

other substances capable of uniting bodies in close cohesion. In building the name is given to a stronger kind of mortar than that which is ordinarily used, consisting of those hydraulic limes which contain silica and therefore set quickly. Cements are variously composed, according to the nature of the surfaces to which they are applied and their exposure to heat and moisture. *Hydraulic* or *water cements* harden under water and consolidate almost immediately on being mixed. Of this kind are the Roman and Portland cements.

Portland cement is made by two processes, the wet and dry. In the wet process the clay and limestone are mixed with a large quan-tity of water in a mechanical mixer. When it has been thoroughly mixed, it is emptied into large reservoirs and allowed to settle. In time the heavy material or raw cement settles to the bottom. The water is drawn off and the raw cement is left to dry in the air until it is a thick paste. It is then placed in the dry-room until all the moisture is evaporated, when it is burned in a suitable kiln. The kiln is brought to a white heat and the cement is kept in it until it is almost glass, or until it is nearly vitrified. It is taken from the kiln in the form of clinkers which are greenish in color. These clinkers are ground to a fine powder between crushing rolls and packed in bags or barrels ready for shipment. In the dry process the clay and limestone are first separately dried in a dry-kiln until all the moisture is expelled. The clay and carbonate of lime are then mixed and crushed and the powdered mixture is tempered with water to a stiff paste in a brickmaking machine and molded into bricks. The mixture is kept warm during the process by steam coils, and the water used for tempering is made strongly alkaline by adding cal-cined soils or newly burned slaked lime. The bricks are then burned to the cement clinker in kilns, and finally ground into powder. A natural cement is made from limestone which has the proper ingredients, but it is not as good as the manufactured cement because the proportions of silica, alumina, and iron do not run evenly in the limestone. Cement increases in strength with age and a good cement will attain half of its ultimate strength and hardness within two months. It has been estimated that Portland cement made into a stiff paste without sand is able to stand a tensile strain of 400 lbs. to the sectional area of 11 sq. in. several days after the test piece is molded, the sample having been kept under water for six days.

**Čenci** (chen'chē). BEATRICE, called the beautiful parricide, the daughter of Francesco Cenci, a noble and wealthy Roman (1527-98), who, according to the common story, after his second marriage, behaved toward the children of his first marriage in the most shocking manner, procured the assassination of two of his sons, on their return from Spain, and debauched his youngest daughter Beatrice. She failed in an appeal for protection to the pope, and planned and executed the murder of her father. She was beheaded 1599 and the Cenci estates confiscated. She is the alleged subject of an admired painting by Guido, and is the heroine of one of Shelley's most powerful plays.

**Cenis**, (sè-në') MOUNT, a mountain belonging to the Graian Alps, between Savoy and Piedmont, 11,755 ft. high. It is famous for the winding road constructed by Napoleon I which leads over it from France to Italy, and for an immense railway tunnel, which, after nearly fourteen years' labor, was finished in 1871. The total length of the tunnel is nearly 8 mi. The total cost amounted to \$13,000,000, which was borne partly by the French and Italian governments and partly by the Northern Railway Company of Italy.

Cen ser, a vase or pan in which incense is burned; a vessel for burning and wafting incense. Among the ancient Jews the censer was used to offer perfumes in sacrifices. Censers, called also thuribles, are still used in the Roman Catholic Church at mass, vespers, and other offices, as well as in some Anglican and other churches. They are of various forms. In Shakespeare's time the term was applied to a bottle perforated and ornamented at the top, used for sprinkling perfume, or to a pan for burning any odoriferous substance.

**Cen' sors**, two officers in ancient Rome who held office for eighteen months, and whose business was to draw up a register of the citizens and the amount of their property, for the purpose of taxation; to keep watch over the morals of the citizens, for which purpose they had power to censure vice and immorality by inflicting a public mark of ignominy on the offender; and to superintend the fluence administration and the keeping up of public buildings. The office was the highest in the state next to the dictatorship, and was invested with a kind of sacred character. The term is now applied to an officer empowered to examine books before publication.

**Cen'sus,** with the Romans a registered statement of the particulars of a person's property for taxation purposes. In modern times a census is an enumeration of the inhabitants of a country, accompanied by any other information that may be deemed useful. In most civilized countries such enumerations now take place at fixed intervals. In the U.S., England, Switzerland, Sweden, and Norway, Holland, Belgium, and Portugal, a census is taken every ten years.

**Cent** (Centime), the name of a small coin in various countries, so called as being equal to a hundredth part of some other coin. In the U. S. and in Canada, the cent is the hundredth part of a dollar. In France the *centime* is the hundredth part of a franc. Similar coins are the *centaro* of Chile, and the *centesimo* of Italy and Peru. Cents or centimes, and their equivalents, are written simply as decimals of the unit of value.

**Cen'taurs**, in Greek mythology, fabulous beings represented as half man, half horse. The earliest notices of them, however, merely represent them as a race of wild, savage men inhabiting the mountains and forests of Thessaly.

## Centrifugal and Centripetal

**Cen' tipede**, a term applied to various insectlike creatures having many feet, and a body consisting of numerous similar rings or segments. The common centipede, found in the



Giant Centipede.

U. S., is quite harmless, but those of tropical countries inflict severe and often dangerous bites. They sometimes grow to a foot in length.

Central America. See America.

Centralia, Marion co., Ill., 62 mi. e. of St. Louis. Railroads: I. C.; J. L. & S. L.; C. & C.; and L. E. & S. L. Industries: railroad shops, and three flouring mills. Surrounding country mineral (coal mines). The town was first settled in 1850 and became a city in 1859. Pop. est. 1897, 7,000.

Central Provinces, an extensive British territory in India. They became a separate administration in 1861, and are under the authority of a chief commissioner. Their total area is 115,936 sq. mi., of which 86,501 sq. mi. are British territory, and 29,435 the territory of native protected states, fifteen in number. Pop. 12,944,805. Center Board, a sort of movable keel used in

**Center Board**, a sort of movable keel used in American yachts, and capable of being raised and lowered in a well extending longitudinally amidships. It tends to prevent leeway and gives the vessel greater stability when under a press of canvas.

Center of Gravity, that point of a body through which the line of the resultant of the weights of all the particles composing the body always passes, whatever be the position of the body.

**Center of Gyration**, the point at which, if the whole mass of a revolving body were collected, the rotatory effect would remain unaltered.

**Center of Osciliation**, that point of a body suspended by an axis, at which, if all the matter were concentrated, the oscillations would be performed in the same time.

Center of Pressure, that point of a body at which the whole amount of pressure may be applied with the same effect as it would produce if distributed: specifically, in hydrostatics, that point in the side of a vessel containing a liquid, to which, if a force were applied equal to the total pressure and in the opposite direction, it would exactly balance the effort of the total pressure.

Centrif'ugal and Centrip'etal, terms ap-

# **Century Plant**

plied to two kinds of inflorescence, the former being that in which the terminal or central flower is the first to expand, as in a true cyme (examples, elder and valerian), the latter being that kind in which the lower or outer flower is the first to expand, as in spikes, racemes, umbels, and corymbs. The laburnum, hemlock, and daisy are examples.

Century Plant, a popular name of the

American aloe. Cephalo'nia, an island of Greece. the largest of the Ionian Islands; area 348 sq. mi.; pop. 80,543. The coast line is very irregular and the surface is mountainous. There is rather a deficiency of water on the island. The principal towns are Argostoli (9,000 in-habitants) and Lixuri (6,000). The chief exports are currants, oil, and grain: wine, cheese, etc., are also exported. Earthquakes are not infrequent. One of the most destructive was that of the year 1867.

**Ceram'**, an island in the Moluccas, lying west of New Guinea; area about 7,000 sq. mi.; pop. est. at 200,000. The vegetation is luxuriant, the sago-palm supplying the chief food of the inhabitants as well as an article of trade. The inhabitants of the coast are of Malay origin, the interior being peopled by Alfoories. It is under the Dutch.

Ceram' ic Art, that department of plastic art which comprises all objects made of baked clay, as vases, cups, urns, bassi-rilievi, statuettes, etc., and including all the varieties of earthenware and porcelain which can be regarded as works of art. See Pottery.

Cerat'odus, a genus of fishes belonging to the Dipnoi or lung fishes. It is the barramunda or native salmon of the Australian rivers, measures from 3 to 6 ft. in length, and



forms an interesting connecting link between the oldest surviving group of fishes and the lowest air breathing animals.

Cer'berus, in classical mythology, the dog monster of Hades, variously described as having a hundred, fifty, and three heads, with a serpent's tail, and a mane consisting of the heads of various snakes. He was subdued by Hercules.

Ce'reals, a term derived from Ceres, the goddess of corn, though sometimes extended to leguminous plants, as beans, lentils, etc., is more usually and properly confined to the Gramineze, as wheat, barley, rye, oats, and other grasses, cultivated for the sake of their seed as food.

**Ceres** (cē'rēz), a Roman goddess. She was the daughter of Kronos and Rhea, and the mother of Proscrpine and Bacchus. She was the goddess of the earth in its capacity of bringing forth fruits, especially watching over the growth of grain and other plants. The

Romans celebrated in her honor the festival of the Cerealia. Ceres was always represented in full attire, her attributes being ears of corn and poppies, and her sacrifices consisted of pigs and cows. Also a planet discovered by M. Piazzi at Palermo, in Sicily, in 1801. It was the first discovered of the asteroids. Its size is less than that of the moon.

Cerro de Pasco, a town of Peru, capital of the department of Junin, 14,275 ft. above the level of the sea. The town came into existence in 1630, in consequence of the discovery of veins of silver there. The climate is trying and the whole place uninviting, though it still contains the most productive of the Peruvian mines. Pop. about 14,000.

Certaido (Cher-tål'do), a small town of North Italy, 15 mi. s.w. from Florence. It is the birthplace, was long the home, and now contains the ashes of Boccaccio, and many interesting relics.

Cervantes Saavedra (thor-van'tes-sa-a-va'drå), MIGUEL DE (1547-1616), author of Don Quixote, b. at Alcalá de Henares, and removed thence to Madrid at the age of seven. He commenced writing verses at an early age, and his pastoral Filena attracted the notice of Cardinal Acquaviva, whom he accompanied to Italy as page. In 1570 he served under Colonna in the war against the Turks and African corsairs, and in the battle of Lepanto (1571) he lost the use of his left hand. After this he joined the troops at Naples, in the service of the Spanish king, winning the high-est reputation as a soldier. In 1575, while re-turning to his country, he was taken by the corsair Arnaut Mami, and sold in Algiers as a slave — a condition in which he remained for seven years, displaying great fortitude. In 1580 his friends and relations at length ransomed him, and, rejoining his old regiment, he fought in the naval battle and subsequent . storming of Terceira. In 1583, however, he retired from service, and recommenced his literary work, publishing in 1584 his pastoral Galatea. In the same year he married, and lived for a long time by writing for the stage, to which he contributed between twenty and thirty plays, of which two only have survived. From 1588 to 1599 he lived retired at Seville, where he held a small office. He did not appear again as an author till 1605, when he produced the first part of Don Quixote, a work having, as its immediate aim, the satirical treatment of the novels of chivalry then popular, but embodying at the same time human types of cosmopolitan interest, and having a profounder bearing upon life than its express object covered. In 1613 his twelve Exemplary Norels (his best work after Don Quirote), in 1614 his Journey to Parnassus, and in 1615 eight new dramas, with intermezzos, were published.

Cervin. See Matterhorn.

Cesnola, LUIGI PALMA, COUNT DI, b. in Italy, June 29, 1832; served in the U.S. army during the Civil War, and was U. S. consul in Cyprus from 1865 to 1875. He discovered and purchased many interesting Cypriote antiquities,

which are now in the Metropolitan museum at New York, of which General Cesnola is secretary and director.

**Cestus**, in classical mythology, a girdle worn by Aphrodītē, or Venus, endowed with the power of exciting love toward the wearer.

**Cestus**, a leathern thong or bandage, often covered with knots and loaded with lead and iron, anciently worn by Roman pugilists to increase the force of the blow.

Ceta'cea, an order of marine animals, sur-They passing in size all others in existence. are true mammals, since they suckle their young, have warm blood, and respire by means of lungs, for which purpose they come to the surface of the water to take in fresh supplies The body is fishlike in form, but ends of air. in a bilobate tail, which is placed horizontally, not, as in the fishes, vertically. The posterior limbs are wanting, and the anterior are converted into broad paddles or flippers, consisting of a continuous sheath of the thick integument, within which are present representatives of all the bones usually found in the fore limb of The fishlike aspect is further inmammals. creased by the presence of a dorsal fin, but this is a simple fold of integument and does not contain bony spines. The right whale and its allies have no teeth in the adult state, their place being taken by the triangular plates of balcen or whalebone which are developed on transverse ridges of the palate, but the foetal whales possess minute teeth, which are very soon lost. The nostrils open directly upward on the top of the head, and are closed by valvular folds of integument which are under the control of the animal. When it comes to the surface to breathe it expels the air violently, and the vapor it contains becomes condensed into a cloud, which resembles a column of water and spray. The blood-vessels in these animals break up into extensive plexuses or networks, in which a large amount of oxygenated blood is delayed, and they are thus enabled to remain a considerable time under water. Injury to these dilated vessels leads to profuse hemorrhage, and hence the whale is killed by the comparatively triffing wound of The Cetacea are commonly dithe harpoon. vided into five families: 1, Balanida, or whalebone whales, divided into two sections: smooth whales, with smooth skin and no dorsal fin, and furrowed whales, with furrowed skin and a dorsal fin; 2, Physeteridæ, Catodontidæ, sperm whales or cachalots, the palates of which have no baleen plates, and which are furnished with teeth, developed in the lower jaw only; 3. Delphinidæ, a family possessing teeth in both jaws, and including the dolphins, porpoises, and narwhal; 4, Rhynchoceti, a family allied to the sperm whales, but having only a pair or two pairs of teeth in the lower jaw, a pointed snout or beak, a single blow hole, etc.: 5, Zeuglodon $tid\alpha$ , an extinct family, distinguished from all the tooth-bearing whales by the possession of molar teeth implanted by two distinct fangs. The last family is exclusively confined to etc. the Eocene, Miocene, and Pliocene periods. The Sirenia, or manatees and dugongs, have sometimes been classified among the Cetacea, but they must be regarded as forming a separate order.

Cetewayo (kech-wā'õ), a Kaffir chief or king, son of Panda, king of the Zulus. Disturbances as to the succession having arisen in Zululand, Mr. Theophilus Shepstone, representative of the Natal government, secured the recognition of Cetewayo as king in 1873. The latter, however, in spite of the obligations into which he had entered, proved a tyrannical ruler, and maintained a large army. A dispute which had arisen regarding lands on the frontier was settled by arbitration in favor of the Zulus; but on the refusal of Cetewayo to comply with the conditions imposed war was declared against him by the British, and the king made prisoner soon after the battle of Ulundi (July, 1879). In 1882 he was conditionally restored to part of his dominions. In the following year he was driven from power by the chief Usibepu, and remained under the protection of the British until his death in 1884.

**Cette** (set), a fortified seaport. France, dep. Hérault. After Marseilles, Cette is the principal trading port in the south of France, and it is much resorted to as a watering place. Pop. 35,517.

**Cevennes** (sè-venz'), a chain of mountains in . the southeast of France, in the widest sense extending from the Pyrenees in the southwest to the Vosges in the northeast, the Côte d'Or being sometimes considered as a part of it, sometimes as a part of the Vosges system. The length of the chain, exclusive of the Côte d'Or, is about 330 mi., the average height not more than 3,000 ft. The highest peak is Mezenc, 5,753 ft.

**Ceylon** (si-lon'), an island belonging to Great Britain in the Indian Ocean. Area 25,333 sq. mi.; pop. 3,012,224. In respect of climate, it is found that where the jungle has been cleared away, and the land drained and cultivated, the country is perfectly healthy; but where low wooded tracts and flat marshy lands abound it is malarial and insalubrious.

Most of the animals found on the opposite continent are native to this island, excepting the tiger. Elephants are numerous, especially in the north and east provinces, and licenses for their capture and exportation are issued by government. The wild life of the island includes bears, buffaloes, leopards, hyenas, jackals, monkeys, wild hogs, several species of deer, porcupines, armadilloes, mungooses, the pangolin or scaly ant eater, the loris, or Ceylon sloth, flying foxes, crocodiles, numerous snakes, partly poisonous, and a great variety of birds of brilliant plumage. Its most valuable products are coffee, tea, rice, cinnamon (which is found almost exclusively in the southwest), and the cocoanut and Palmyra palm. The south parts of the island produce the jaggery palm. the sap of which yields a coarse sugar, and its fruit a substitute for rice flour. The taliput palm. the jack, and bread-fruit trees, are abundant and the Ceylon areca nut, celebrated for its superior qualities, is exported in large quantities. Excellent tobacco is raised in the north

The island abounds with timber of district. various descriptions, including ebony, satin, rose, sapan, iron, jack, and other beautiful woods adapted for cabinet work. Attention has been directed latterly to the cultivation of cinchona, cacao, and silk. The chief mineral products are iron, plumbago or graphite, and a variety of gems, including sapphires, rubies, etc. The pearl fisheries of Ceylon are famous, but, for some unexplained reason, sometimes fail for years, there having been none between 1837 and 1854, or between 1863 and 1874. The exports comprise coffee, tea, plumbago, areca nuts, cocoanut oil, fiber, and kernels (copra), cinnamon, cinchona, cacao, etc. The principal articles of import are manufactured goods chiefly from Great Britain, as cotton manufactures, apparel and haberdashery, iron and steel manufactures, machinery, etc.; from other countries dried fish, rice, wheat, sugar, tea, cowries, etc. The island is provided with a system of excellent roads, and the railways have a length of about 200 mi.

Ceylon is one of the British colonies, the government being conducted by a governor and two councils, executive and legislative, of both of which the governor is president. The island is divided into eight provinces.

The present population of Ceylon is composed of Singhalese or Cingalese, who are the Ceylonese proper, Tamils (from India), Moormen or Moors, Malays, Veddahs, a small proportion of Europeans and their descendants, and negroes. The Singhalese are in stature rather below the middle size; their limbs slender, but well shaped, eyes dark, finely-cut features, hair long, smooth, and black, turned up and fixed with a tortoise-shell comb on the top of the head; color varying from brown to black, or rather from the lightest to the darkest tints of bronze. The general population of the island was decreasing for several conturies. It is now, however, on the increase, and latterly this increase has been rapid.

The Singhalese possess a native chronicle, the Mahawanso, which records the history of the island from 543 B.C. onward, under a long series of kings reigning most frequently at the ancient capital Anuradhapura, the earliest of these being leader of an invading host from India. Buddhism was introduced 307 B.C. These incomers brought with them the civilization of India; great part of the country became covered with towns and villages having temples and dagobas, agriculture flourished, and the aborigines (represented by the Veddahs of to-day) were compelled to construct artificial lakes, tanks, and other irrigation works. The capital, Anuradhapura, as its ruins still testify, was a place of great extent and magnificence. The island was not known to Europeans till the time of Alexander the Great, and their knowledge of it was long vague and meager. By the time of Pliny it had become better known, and he gained much additional information from Ceylonese envoys that were sent to Rome. In the Middle Ages the country was much troubled by invasions of the Malabars, and for a time it was

even tributary to China. It had greatly declined in prosperity when visited by Europeans, the first of whom was Marco Polo in the end of the thirteenth century. At its most flourishing period its population was probably ten times as great as at present. Little, however, was known in Europe regarding the island until 1505, when the Portuguese established a regular intercourse with it, and When latterly made themselves masters of it. they arrived the Malabars were in possession of the north, the Moors or Arabs held all the seaports, the rest was under petty kings and chiefs. The Portuguese, who were cruel and oppressive rulers, were subsequently expelled by the Dutch in 1658, after a twenty years' The Dutch in turn were driven struggle. from the island by the British in 1796, though a part of the island remained independent under native princes. The king of Kandy, nominally the sovereign of the island, was deposed in 1815 on account of his cruelties, and the island was then finally annexed by Britain, though a rebellion had to be put down in 1817. The principal towns are Colombo (the capital), Kandy, Point de Galle, Jaffna, and Trincomalee.

**Chablis** (shå-blē), a town. France, dep. Yonne, famous for white wines of a beautifully clear and limpid color, good body, and extreme delicacy of flavor. Pop. 2,185.

Chadbourne, PAUL ANSEL (1823-1883), American educator, b. in Maine. He graduated in 1848 at Williams College, of which he became president in 1872, succeeding Mark Hopkins.

**Chaff Cutter**, an agricultural instrument for chopping hay or straw into lengths to be used as food for animals. The economical advantage of the chaff cutter does not depend on its rendering the chopped food more digestible; but on permitting it to be more thoroughly mixed with the more nutritive and palatable food, and preventing the animal from rejecting any part of it. By the use of the chaff cutter animals are therefore induced to consume a much larger proportion of fodder with their food, which not only improves the condition of the stock, but saves time in feeding, thus allowing the animal more time to repose.

**Chaff inch**, a lively and handsome bird of the finch family, very common in Britain, where its haunts are chiefly gardens and shrubberies, hedgerows, plantations, etc. The male is 6 or 7 in. in length, and is very agreeably colored, having a chestnut back, reddish-pink breast and throat, and a yellowish-white bar on the wings. The food consists of seeds and of insects and their larvæ. The nest, which is generally placed in the fork of a tree, is an elegant structure usually covered with moss and lichens.

**Chagos** (chā'gōs) **Islands**, a group of islands in the Indian Ocean belonging to Britain. They are scantily peopled, and the chief product is cocoanut oil,

**Chagres** (chä'gres), a seaport of Colombia, on the north coast of the Isthmus of Panama, at the mouth of the Chagres River, formerly



of some importance. It is destined to be one of the outlets of the Panama canal when that long-delayed project is completed.

**Chain,** in surveying, is a measure consisting of 100 links, each 7.92 in. in length and having a total length of 4 rods, or 66 ft. 1t is sometimes called Gunter's chain, from its inventor.

Chain Making .- For the manufacture of a chain only the softest and best iron obtainable is selected because it is necessary that it weld readily. The iron is brought to the factory in coils about 100 ft. each for the smaller chains and in bars about 18 ft. long for larger chains. The coiling is done when the iron is cold thus proving the quality of it. The coils are taken to a powerful steam shear where each small coil is cut through on one side and the pieces allowed to fall into a keg. These pieces now look like a link open at one end and as the cut was made at an angle, when ' the two ends of the link are brought together they will lap over each other. These open links are put in a furnace and heated to a white heat. Each link is then taken out and hooked through a link which has been finished and which forms a part of the chain which is being made. The open ends of the link are then firmly welded with a hammer. When a large size chain is being made the bars of iron are cut into pieces just long enough for the desired length because it is impossible to coil the larger sizes of iron into spirals. The**s**e pieces are heated and bent into a U shape and then welded. The ends of the links being crossed over each other about an inch to make a stronger weld. In the cheaper grades of machine-made chains the welding is done under a steam hammer. When chains are made for use over sprocket wheels the inside diameter of the links must be of a certain size. The chains that require the greatest skill and care are the heavy chains used on dredges and steam shovels. Before a chain is shipped it is tested by being put in a pulling machine. A machine has recently been invented for manufacturing chains and it is now possible to make excellent chains from a cheaper grade of iron on account of doing away with the weld. The machine consists of four rolls which are so arranged that they work all at the same time on the bar of iron which is put between them. Small curves on the rolls, which look like chain links, are steel dies or cutters highly tempered and hardened. The heated iron is made to pass in between the four rolls of the machine which revolve rapidly. The guides on the four edges of the rolls operate simultaneously on the four flanges of the iron bar pressing it into the form of a chain. This leaves small pins of iron between the links and it is necessary to remove these by means of cutters and molds. Then the chain is heated again and run through the rolls which straighten out the links and give a smooth, finished appearance to the chain. This machine can turn out about one yard of chain per second.

**Chain Pump**, a pump consisting in principle of an endless chain equipped with a number of valves or buckets moving round two wheels, one above and one below. The chain in its ascent passes through a tube closely fitting the valves or buckets, the water being discharged either from the top of the tube or from an orifice in it.

**Chain Shot**, two cannon balls connected by a chain, which, when discharged, revolve upon their shorter axis, and mow down masts, rigging, etc.

**Chalce'don** (kal-sē'don), a Greek city of ancient Bithynia, opposite Constantinople, at the entrance of the Black Sea, about 2 mi. s. of the modern Scutari. It was a flourishing town when it came into possession of the Romans, under the testament of Nicomedes, B.C. 74, as included in the kingdom of Bithynia. It was finally destroyed by the Turks, about 1075.

**Chalced** ony (kal-sed'o-ni), a mineral, a variety of quartz, called also white agate, resembling milk diluted with water, semitransparent or translucent, and more or less clouded with circles and spots. It is found usually in cavities of rocks uncrystallized, in veins, botryoidal masses, etc., and is used in jewelry. There are several varieties, such as the common chalcedony, chrysoprase, sard, and sardonyx.

**Chalcis** (kal'sis), a Greek town, separated by the narrow strait of Euripus from the Beotian coast, on the mainland of Greece. Chalcis early became one of the greatest of the Ionic cities, carrying on an extensive commerce, and planting numerous colonies in Syria, Macedonia, Italy, Sicily, and the islands of the Ægean Sea. It was subsequently a place of importance under the Romans. There is still a town on the site, consisting of an inner walled town and an outer suburb, and said to be one of the prettiest and most attractive of Greek provincial towns. A bridge, so constructed as to let vessels pass through, connects it with the mainland. Pop. 12,250.

**Chalæa**, an ancient geography, the southerly part of Babylonia, or in a wider sense, corresponding to Babylonia itself. The name Chaldæans was especially applied latterly to a portion of the Babylonian Magi, who were devoted to the pursuit of astronomy and magical science.

Chaldee Language, a name often given to the Aramean language, one of the principal varieties of the ancient Semitic. Chaldee literature is usually arranged in two divisions: the Biblical Chaldee, or those portions of the Old Testament which are written in Chaldee, namely, Daniel from 2:4 to 7:28: Ezra 4:8 to 6:18; and 7:12-26; and Jeremiah 10:11; and the Chaldee of the Targums, and other later Jewish writings.

**Chaldeur Bay** (sha-lör'), an inlet of the Gulf of St. Lawrence, between Quebec and New Brunswick. The French fleet was here defeated by the British in 1760.

**Chalk** (chak), a well-known earthy limestone, of an opaque white color, soft and admitting no polish. It is an impure carbonate

# Challemel-Lacour

of lime, and is used as an absorbent and antacid, and for making marks for various purposes, as on the blackboard in schools, and by artisans and others. *Black chalk* is a soft variety of argillaceous slate. *Brown chalk*, a familiar name for umber. *Red chalk*, another name for ruddle. *French chalk*, steatite or soapstone, a soft magnesian mineral. *Drawing chalks* were originally restricted in colors to white, black, and red, but now chalks of every color are used, and are known by the name of *crayons*. In geology chalk is the rock which forms the higher part of a series or group of strata, comprising rocks of different kinds, termed the cretaceous system.

**Chailemei-Lacour**, PAUL ARMAND, French statesman, b. May 19, 1827; became a college professor and was banished by Napoleon III. After the downfall of the empire he was made Prefect of the Rhone. He was elected to the Chamber as a Radical in 1872; became a senator in 1876. In 1879 he was sent as ambassador to Switzerland, and from June, 1880, until February, 1882, represented France in London. In 1883 he became minister of foreign affairs. He founded, and was chief editor of, the *République Française*, an influential journal of Paris.

**Chal' lenge**, to jurors, is an objection either to the whole panel or array, that is, the whole body of jurors returned, or to the *polls*, that is, to the jurors individually: aud it is either *peremptory*, that is, without assigning any reason, or *for cause* assigned. See *Jurg*.

Challenger Expedition, a circumnavigating scientific exploration of the open sea sent out by the British government in 1872-76-earlier expeditions being those of the Lightning (1868) and Porcupine (1870). In 1872 the Challenger, a corvette of 2,306 tons, was completely fitted out and furnished with every scientific appliance for examining the sea from surface to bottom-natural history work room, chemical laboratory, aquarium, etc. The ship was given in charge to a naval surveying staff under Captain Nares; and to a scientific staff, with Professor (afterward Sir) Wyville Thomson at their head, for the purpose of sounding the depths, mapping the basins, and determining the physical and biological conditions of the Atlantic, the Southern, and the Pacific Oceans.

With this new commission the *Challenger* weighed anchor at Sheerness Dec. 7, 1872, and on the evening of May 24, 1876, she dropped anchor at Spithead, having in these three and a half years cruised over 68,900 nautical miles, and made investigations at 362 stations, at each of which were determined the depth of channel; the bottom, surface, and fauna; and the atmospheric and meteorological conditions. The route was by Madeira, the Canaries, the West Indies, Nova Scotia, Bermudas, Azores, Cape Verd, Fernando Noronha, Bahia, Tristan d' Acunha, Cape of Good Hope. Kerguelen, Melbourne, the Chinese Sea, Hong Kong, Japan, Valparaiso, Magellan's Strait, Montevideo, Vigo, and Portsmouth. Between the Admiralty Isles and Japan the *Challenger* made her deepest sounding, on March 23, 1875, 4,575 fathoms.

**Chaimers**, a noted Scotch family, famous as producing 1, Alexander C. (1759-1834), author of several useful works including a general *Biographical Dictionary*; 2, George C. (1742-1825), a famous Scotch anlynarian; and 3, Thomas C. (1780-1847), a noted Scotch preacher and author.

Chalons-sur-Marne (shä-löŋ-sùr-mårn). a city of France, capital of the department Marne (Champagne). There are manufactures of woolen and cotton goods: also cotton mills, tanneries, etc. In 451 Attila was defeated before the walls of Châlons, and from the tenth century it flourished as an independent state under counts-bishops, having about 60,000 inhabitants. After being united to the French crown, in 1360, it declined. A celebrated camp was established by Napoleon III about 18 mi. from Châlons for the purpose of training the French troops, still to some extent employed. Pop. 25,863.,

**Chalybeate Waters** (ka-lib'ē-āt), waters holding iron in solution, either as a carbonate or as a sulphate with or without other salts. All waters containing iron are distinguished by their styptic, inky taste, and by giving a more or less deep color with an infusion of tea or of nutgalls.

**Chalybite** (kal'i-bIt), an ore of iron, a native anhydrous-metacarbonate, existing abundantly under the name of *Spathic* or *Sparry Ore*, or *Siderite*. A siliceous or argillaceous variety called clay ironstone, occurring in the coal measures, is one of the most abundant and valuable ores of iron. Combined with carbonaceous matter it forms the black-band ironstone.

**Chamalari** (Cham'alhari), a peak of the Himalaya Mountains, at the western extremity of the boundary line between Bhutan and Thibet. Height 23,929 ft.

Chamber, a word used in many countries to designate a branch of government whose members assemble in a common apartment, as the chamber of deputies in France, or applied to bodies of various kinds meeting for various purposes. The imperial chamber of the old German Empire was a court established at Wetzlar, near the Rhine, by Maximilian I in 1495, to adjust the disputes between the different independent members of the German Empire, and also such as arose between them and the emperor. Chambers of Commerce are associations of the mercantile men of towns for the purpose of protecting and furthering the interest of the commercial community.

**Chamberlain**, JOSEPH, English statesman, b. in London in 1836, and educated at London University school. He became a member of a firm of screw makers at Birmingham, but gave up active connection with the business in 1874. He early became prominent in Birmingham both in connection with civic and political affairs, being an advanced radical and an able speaker, was chairman of the school board, and thrice in succession mayor of the city (1874-76). In 1876 he entered Parliament as a representative of Birmingham, and at the

general election of 1880 he was chosen for the same city along with Mr. Bright and Mr. Under Mr. Gladstone's premiership Muntz. he now became president of the Board of Trade, and a cabinet minister. In the Gladstone government in 1886 he was president of the Local Government Board; but his leader's Irish policy caused him to resign, and since then, as member for West Birmingham, he has been one of the most pronounced members of the Liberal Unionist party. In the winter of 1887-88 he was in America as one of the British representatives appointed to negotiate a settlement of the fishery disputes between Canada and the U. S., but the treaty which resulted has not yet been ratified. In the Marquis of Salisbury's Coalition cabinet he became colonial secretary.

**Chambers** (chām'berz), EPHRAIM, a miscellaneous writer, and compiler of a popular *Dictionary of Arts and Sciences*, b. at Kendal, in Westmoreland, in the latter part of the seventeenth century. During his apprenticeship to a mathematical instrument and globe maker in London he formed the design of compiling a *Cyclopædia*, and even wrote some of the articles for it behind his master's counter. The first edition was published in 1728. Several subsequent editions appeared previous to his death in 1740, and it was the basis of the cyclopædia of Dr. Abraham Rees.

Chambers, ROBERT (1802-1871), a historical and miscellaneous writer, the younger of two brothers originally composing the publishing firm of W. & R. Chambers. He received his education at the Peebles parish school and in the high school of Edinburgh. His family experiencing a reverse of fortune, he got together all the books belonging to his mother and himself, their value being about \$10, and at the age of sixteen commenced business as a bookseller in Edinburgh. He edited Scottish Ballads and Songs, and a Biographical Dic-tionary of Eminent Scotsmen; then the two brothers commenced Chambers's Edinburgh Journal, which achieved an immense success. From this time they united in the publishing business, and issued a series of works for the entertainment and instruction of "the people." Robert Chambers contributed numerous essays to the Journal, besides editing or compiling many instructive works of a high class, including the Cyclopædia of English Literature. WILLIAM CHAMBERS (1800-1883). He was twice lord provost of Edinburgh, and latterly bore the expense of restoring the old church of St. Giles, Edinburgh. He also presented the town of Peebles with an institution embracing a library and reading-room, museum, etc.

Chambersburg, Franklin co., Pa., 52 mi. s.w. of Harrisburg. Railroads: Cumberland Valley: Phila. & Reading; Western Maryland; Mont Alto and South Penn. Industries: iron foundry, three flouring mills, woolen mill, plow, shoe, furniture. sash and door, and other factories. Surrounding country agricultural and mineral. First settled in 1764 by Benjamin Chambers. Pop. est. 1897, 10,250.

Chambéry (shān-bā-ri), a town of southeast

France, capital of dep. Savoie. In its vicinity are excellent baths, much frequented in summer. It has manufactures and distilleries. Pop. 20,922. Chambord (shän-bör), a castle, park, and village, near Blois, dep. of Loir-et-Cher, in

**Chambord** (shüŋ-bör), a castle, park, and village, near Blois, dep. of Loir-et-Cher, in France. The splendid castle, in the Renaissance style, was mainly built by Francis I. In 1745 it was given by Louis XV to Marshal Saxe, who died there in 1750. Napoleon gave it to Berthier, and in 1821 a company of Legitimists bought it and gave it to the duke of Bordeaux in the name of the people of France.

Chambord (shän-bor), HENRI CHARLES FERdinand Marie Dieudonné, Comte de (1820-1883), duke of Bordeaux, the last representative of the elder branch of the French Bourbon dynasty, called by his partisans Henry V of France. He was b. seven months after the assassination of his father, Prince Charles Ferdinand d'Artois, duke de Berry. Charles X, after the revolutionary outbreak of 1830, abdicated in his favor; but the young count was compelled to leave the country with the royal title unrecognized by the nation. In 1846 he married the Princess Maria-Theresa, eldest daughter of the duke of Modena; and in 1851 inherited the domain of Frohsdorf, near Vienna, where for the most part he subsequently resided. While abstaining from violent attempts to seize the crown, he let slip no opportunity of urging his claims, especially after Sedan; but his belief in divine right, his devotion to the see of Rome, and his failure to recognize accomplished facts and modern tendencies, destroyed all chance of his succession.

**Chambre Ardente** (shän-br-år-dänt), the name formerly given in France to an apartment, hung with black and lighted with tapers, in which sentence of death was pronounced on heinous offenders. The name was afterward more especially given to those extraordinary tribunals which, from the time of Francis I, ferreted out heretics by means of a system of espionage, directed the proceedings against them, pronounced sentence, and also saw it carried into execution.

**Chame' ieon** (ka-mē'li-on), a genus of reptiles belonging to the Saurian or lizard order, a



Chameleon.

native of parts of Asia, Africa, and the south of Europe. The best-known species has a naked body 6 or 7 in. long, with a prehensile

### Chamols

tail of about 5 in., and feet suitable for grasping branches. The skin is cold to the touch, and contains small grains or eminences of a bluish-gray color in the shade, but in the light of the sun all parts of the body become of a grayish-brown or tawny color. It possesses the curious faculty, however, of changing its color, either in accordance with its environment, or with its temper when disturbed, the change being due to the presence of clear or pigment-bearing contractile cells placed at various depths in the skin, their contractions and dilatations being under the influence of the fable that they lived on air, but they are in reality insectivorous, taking their prey by rapid movements of a long viscid tongue. In general habit they are dull and torpid.

**Chamois** (sham'wii), a species of goat-like antelope inhabiting high, inaccessible mountains in Europe and Western Asia. Its horns, which are about 6 or 7 in. long, are round, almost smooth, perpendicular and straight until near the tip, where they suddenly terminate in a hook directed backward and downward. Its hair is brown in winter, brown fawn color in summer, and grayish in spring. The head is of a pale yellow color with a black band



### Chamois.

from the nose to the ears and surrounding the eyes. The tail is black. Its agility, the nature of its haunts, and its powers of smell, render its pursuit an exceedingly difficult and hazardous occupation.

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**Chamomile** (or Camomile) (kam'o-mIl), a wellknown plant belonging to the natural order Compositæ. It is perennial, and has slender. trailing, hairy, branched stems. The flower is white, with a yellow center. Both leaves and flowers are bitter and aromatic. The fragrance is due to the presence of an essential oil, called oil of chamomile, of a light blue color when first extracted, and used in the preparation of certain medicines. Both the leaves and the flowers are employed in fomentations and poultices, and also in the form of an infusion as a stimulant or anti-spasmodic. It is cultivated in gardens in the U. S., and also found wild. **Chamouni** (or Chamonix) (shā-mö-nē, shā-

# Champaign

mo-në), a celebrated valley in France, department Haute-Savoie, in the Pennine Alps, 3,000 ft. above sealevel. The mountains on the e. side are always snow-clad, and from these proceed numerous glaciers, such as the Glacier de Bossons and the Mer de Glace. The village of Chamouni (pop. 1,500) is much frequented by tourists, and is one of the points from which they visit Mont Blanc.



### Chamomile.

**Champagne** (shāŋ-pāny), an ancient province of France, which before the Revolution formed one of the twelve great military governments of the kingdom. It forms at present the departments of Marne, Haute-Marne, Aube, Ardennes, and part of those of Yonne, Aisne, Seine-et-Marne, and Meuse. Troyes was the capital.

Champagne (sham-pan'), a French wine, white or red, which is made chiefly in the department of Marne, in the former province Champagne, and is generally characterized by the property of creaming, frothing, or effervescing when poured from the bottle, though there are also still Champagne wines. The creaming or slightly sparkling Champagne wines are more highly valued by connoisseurs. and fetch greater prices than the full-frothing wines, in which the small quantity of alcohol they contain escapes from the froth as it rises to the surface, carrying with it the aroma and leaving the liquor nearly vapid. The property of creaming or frothing possessed by these wines is due to the fact that they are partly fermented in the bottle, carbonic acid being thereby produced. Wine of a similar kind can of course be made elsewhere, and some of the German champagnes are hardly to be distinguished from the French. Much artificial or imitation champagne is sold and an excellent wine of similar nature is made in California.

**Champaign**, Champaign co., Ill., 128 mi. s.s.w. of Chicago. Surrounding country agricultural. Railroads: Chicago div. of Central railroad, and the Indianapolis, Bloomington & Western. The Illinois State Industrial University is located here. Principal industries: wagon and furniture manufactories. Pop. est. 1897, 6.000.

**Champ-de-Mars** (shän-dè-märs), that is, Field of Mars, an extensive piece of ground in Paris, used as a place of military exercise. It was here that Louis XVI swore to defend the new constitution in 1790, and it was the site of the exhibitions of 1867 and 1878.

**Champlain** (sham-plān) LAKE, a lake chiefly in the U. S. between the states of New York and Vermont, but having the north end of it in Canada; area about 600 sq. mi. It is connected by canal with the Hudson River, and has for outlet the river Richelieu, or Sorel, flowing north to the St. Lawrence. Its scenery is beautiful, and attracts many visitors.

**Champlain** (shän-plan), SAMUEL (1570-1635), a French naval officer and maritime explorer. His exploits in the maritime war against Spain in 1595 attracted the attention of Henry IV, who commissioned him in 1603 to found establishments in North America. After three voyages for that purpose, in the last of which he founded Quebec, he was in 1620 appointed governor of Canada.

Champollion (shän-pol-yön), JEAN FRANCOIS (1790-1832), French scholar, celebrated for his discoveries in the department of Egyptian hieroglyphics, b. at Figeac, department of Lot, France. He went to Paris, where, with the aid of the trilingual inscription of the Rosetta Stone and the suggestions thrown out by Dr. Thomas Young, he discovered the key to the graphic system of the Egyptians, the three elements of which - figurative, ideographic, and alphabetic-he expounded before the Institute in a series of memoirs in 1823. These were published in 1824 at the expense of the state. In 1826 Charles X appointed him to superintend the department of Egyptian antiq-uities in the Louvre; in 1828 he went as director of a scientific expedition to Egypt; and in 1831 the chair of Egyptian archæology was created for him at the Collége de France.

**Chan'cellorsville**, the site of one of the greatest battles of the American Civil War, in which, on May 2, 3, and 4, 1863, a nominal victory was gained by the Confederates under Generals Lee and Jackson over the Federal troops commanded by General Hooker. The Federal troops, though compelled to retreat across the Rappahannock, carried with them some thousands of prisoners and one more gun than they had lost, while the Confederates lost from 15,000 to 18,000 men and their brilliant leader, "Stonewall" Jackson.

**Chan'cery,** formerly the highest court of justice in England next to Parliament, but since 1873 a division of the High Court of Justice, which is itself one of the two departments of the Supreme Court of Judicature. In American law a court of general equity jurisdiction. Separate courts of chancery or equity exist in some of the states; in others the courts of law sit also as courts of equity;

in others the distinction between law and equity has been abolished or never existed.

**Chandausi** (chan-dou-sē'), a town of India. N. W. Provinces, Moradabad district. Pop. 27,521.

**Chan' dernagore**, ("city of sandalwood"), a town in Hindustan, belonging to France, on the right bank of the Hooghly, 16 mi. n.n.w. of Calcutta. The French established a factory in it in 1676, and in 1688 obtained a formal cession of it, together with its territory of 2,325 acres, from Aurungzebe. It was three times occupied by the British, but was finally restored to the French in 1816. Pop. of town and territory 30,000.

Chandler, WILLIAM EATON, statesman, b. in Concord, N. H., 1835; graduated at Harvard law school in 1855, and in 1862 was elected to the state legislature. From 1868 to 1876 he served as secretary of the Republican national committee. On March 23, 1885, he was nominated for solicitor general of the U. S., but was not confirmed by the senate. In 1882 he became secretary of the navy, and held that office until 1855. In 1837 he was elected to fill a vacancy in the U. S. Senate, and was reelected for the term ending in 1895.

**Chandler**, ZACHARIAH (1813–1879). American statesman. In 1851 he was elected mayor of Detroit, Mich. He assisted in organizing the Republican party, and in 1857 was elected U. S. senator. He was re-elected in 1863 and 1869, and in 1874 he was made secretary of the interior, which post he held until March 1, 1877. In 1876 he was chairman of the Republican national committee. He was re-elected to the U. S. Senate in February, 1879.

**Chang-Chow-Foo**, a city, China, province of Fokien, 36 mi. s.w. of Amoy, which is its port. It stands in a valley surrounded by hills and intersected by a river, and is the center of the silk manufacture of the province. Pop. est. at from 800,000 to 1.000.000.

**Changarnier**, NICOLAS (1793-1877), a French soldier. He distinguished himself in the Algerian campaigns from 1830 to 1847, and became general of division and maréchale-decamp. In May, 1848, he became governor general of Algeria. In the same year he was recalled and was made commander in chief of the national guard of Paris. He was deprived of his command in 1851, and at the *coup d'état* of that year he was arrested and exiled. During the Franco-Prussian War he offered his sword to France and was sent to Metz. He opposed the surrender of that fortness and of Bazaine's army, but was overruled. After the war he was made a senator.

**Channel Islands**, a group of islands in the English Channel, off the west coast of department La Manche, in France. They belong to Britain, and consist of Jersey. Guernsey, Alderney, and Sark, with some dependent islets. The islands have been fortified at great expense. They form the only remains of the Norman provinces once subject to England. Area 112 sq. mi.; pop. 88,289.

**Channing** (chaning), WILLIAM ELLERY (1780-1842), a famous American preacher and writer,

b. at Newport, Rhode Island. in 1780. He studied at Harvard College, became a decided Unitarian, and propagated Unitarian tenets with great zeal and success. His first appointment as a pastor was in 1803, when he obtained the charge of a congregation in Boston, and ere long he became known as one of the most popular preachers of America. His reputation was still further increased by the publication of writings, chiefly sermons, reviews, etc., on popular subjects. His nephew, WILLIAM HENRY CHANNING (1810–1884), also a Unitarian preacher (for some time at Liverpool) and supporter of the socialistic movement, has written a memoir of his uncle, and other works.

**Chantiliy** (shan-tē-yē), a town, France, department of the Oise, 25 mi. n.n.e. of Paris, celebrated for a variety of lace made here and in the neighborhood, for the splendid château, built by the great Condé, but leveled by the mob at the Revolution; and also for another palace built by the Duc d' Aumaie after the estate came into his possession in 1850, which, along with the fine domain, was presented by the duke to the French Institute in 1887. It is a horse-racing center. Pop. 4,000. **Chant' rey**, SIR FRANCIS (1781-1842), a noted

**Chant' rey**, Sir FRANCIS (1781-1842), a noted English sculptor, b. near Sheffield, was the son of a well-to-do carpenter. In 1802 he commenced work for himself at Sheffield by taking portraits in crayons. After studying at the Royal Academy in London, he eventually settled in the metropolis, where he presented numerous busts at the exhibitions of the Royal Academy. His most celebrated works are the Skeping Children, in Litchfield Cathedral; the statue of Lady Louisa Russell, in Woburn Abbey; the bronze statue of William Pitt, in Hanover Square, London; a statue of Washington, in the state house, Boston; and statues of Horner, Canning, Sir J. Makcolm, etc., in Westminster Abbey. His best works are his busts, but his full-length figures betray an insufficient acquaintance with anatomy, and several of his equestrian statues are still more defective.

**Chanzy,** ANTOINE EUGENE ALFRED (1823-1883), a French soldier. He distinguished himself in Italy and Algeria, and in 1870 commanded the army of the Loire. He was defeated at Le Mans, Jan. 12, 1871. In 1873 he was appointed governor general of Algeria, in 1875 was made a life senator, and in 1879 became ambassador at St. Petersburg.

**Chao-Chow**, a city. China, province Quang-Tong, on the river Han, 195 mi. n. e. of Hong-Kong, the center of an important maritime division of the province.

**Chaos** (kā'os), in old theories of the earth, the void out of which sprang all things or in which they existed in a confused, unformed shape before they were separated into kinds.

**Chapola** (chá-pa'la), a picturesque lake of Mexico, states of Xalisco and Michoacan. Area 1,400 sq. mi.

**Chapin**, EDWIN HUBBELL (1814-1880), American clergyman. He was ordained a minister in 1827, and had charge of a church in Richmond, Va., for three years, removing thence to Charlestown, Mass. After six years of service there he became the colleague of Hosea Ballou in the School Street Universalist church, Boston. In 1848 he became pastor of the Fourth Universalist church in New York City. He became one of the most popular and prominent of the preachers of New York. He was a delegate to the Peace Congress at Frankfort-onthe-Main in 1850. He was a trustee of Bellevue Medical College and Hospital, and the Chapin Home for aged men and women was named in his honor.

**Chapleau**, JOSEPH ADOLPHE, Canadian statesman, b. in Quebec, Nov. 9, 1840. In 1873 he became solicitor general of the province. He was a strong conservative, and was considered the leading French-Canadian orator of the time. In 1879 he was premier of Quebec, and in 1882 became secretary of state for Canada.

**Chapman**, GEORGE (1557-1634), an English poet, the earliest, and perhaps the best, translator of Homer. His translation of the *Itiad* was published in three separate portions in 1598, 1600, and 1603. It has been highly commended by such poets as Pope, Keats, and Coleridge, as also by Lamb. Keats's sonnet, On First Looking into Chapman's Homer ("Then felt I like some watcher of the skies," etc.), is well known.

**Chapoo**, a seaport, China, province Chekiang, on the north side of a large bay, 35 mi. n. from Ningpo. It carries on a considerable trade with Japan.

**Char** (or Charr), a European fresh-water fish of the salmon genus, found plentifully in the deeper lakes of England, Wales, and Ireland, more rarely in those of Scotland. The chars inhabit the colder regions of deep waters, where the temperature is less liable to vary. The body somewhat resembles that of a trout, but is longer and more slender, as well as more brilliant in coloring, with crimson, rose, and white spots; weight sometimes 2 lbs., but generally under 1 lb. Char is much esteemed for the table.

**Charade** (sha-räd' or sha-råd'), a kind of riddle, the subject of which is a word that is proposed for discovery from an enigmatical description of its several syllables, taken separately as so many individual and significant words. When dramatic representation is used to indicate the meaning of the syllables and the whole word it is called an acting charade.

**Char'coal**, a term applied to an impure variety of carbon, especially such as is produced by charring wood. One kind of it is also obtained from bones: lampblack and coke are also varieties. Wood charcoal is prepared by piling billets of wood in a pyramid form, with vacuities between them for the admission of air, and causing them to burn slowly under a covering of earth. In consequence of the heat, part of the combustible substance is consumed, part is volatilized, together with a portion of water, and there remains behind the carbon of the wood, retaining the form of the ligneous tissue. Another process consists in heating the wood in close vessels, by which the volatile parts are driven off, and a char-

coal remains in the retorts, not so dense as that obtained by the other process. Wood charcoal, well prepared, is of a deep black color, brittle and porous, tasteless and inodorous. It is infusible in any heat a furnace can raise; but by the intense heat of a powerful galvanic apparatus it is hardened, and at length is volatilized, presenting a surface with a distinct appearance of having undergone Charcoal is insoluble in water, and fusion. is not affected by it at low temperatures; hence, wooden stakes which are to be immersed in water are often charred to preserve them, and the ends of posts stuck in the ground are also thus treated. Owing to its peculiarly porous texture, charcoal possesses the property of absorbing a large quantity of air or other gases at common temperatures, and of yielding the greater part of them when heated. Charcoal likewise absorbs the odoriferous and coloring principles of most animal and vegetable substances, and hence is a valuable deodorizer and disinfectant. It is used as fuel in various arts, where a strong heat is required, without smoke, and in various metallurgic operations. By cementation with charcoal, iron is converted into steel. It is used in the manufacture of gunpowder. In its finer state of aggregation, under the form of ivoryblack, lampblack, etc., it is the basis of black paint; and mixed with fat oils and resinous matter, to give a due consistence, it forms the composition of printing ink.

**Charente** (shā-röŋt), a river in Western France, rising in the department of Haute-Vienne, and falling into the sea about 8 mi. below Rochefort, opposite to the isle of Oleron, after a course of about 200 mi. It gives its name to two departments. CHARENTE, an inland department, formed chiefly out of the ancient province of Angoumois, and traversed by the river Charente; area 2,294 sq. mi.; capital Angoulème. The wines are of inferior quality, but they yield the best brandy in Europe, the celebrated cognac brandy being made in Cognac and other districts. Pop. 360,259. CHARENTE-INFÉRIEURE (an-fā-ri-eur) ("Lower Charente"), a maritime department, comprises parts of the former provinces of Angoumois and Poitou: area 2,635 sq. mi. The wine is of common quality, and chiefly used for making brandy. Oysters and sardines abound on the coast. Salt and brandy are the only articles manufactured to any great extent. Capital La Rochelle. Pop. 450,202.

**Cha'ring Cross,** the titular center of London, so named from a cross which stood until 1647 at the village of Charing in memory of Eleanor, wife of Edward I. It is now a triangular piece of roadway at Trafalgar Square.

**Charlot**, a term applied to vehicles used both for pleasure and in war. Ancient charlots, such as those used among the Egyptians. Assyrians, Greeks, and Romans, were of various forms. A common form was open behind and closed in front, and had only two wheels. The charlot was strongly and even elegantly built. but not well adapted for speed. In ancient warfare charlots were of great importance. In the

## Charlemagne

Egyptian chariots the framework, wheels, pole, and yoke were of wood, and the fittings of the inside, the bindings of the framework, as well as the harness were chiefly of rawhide or tanned leather. We have number of sculp-tures which give a clear idea of the Assyrian chariots. These resemble the Egyptian in all essential features, containing almost invariably three men-the warrior, the shield-bearer, and the charioteer. A peculiarity of both is the quiver or quivers full of arrows attached to the side. From the front of the chariot a singular ornamental appendage stretches forward. War chariots had sometimes scythe-like weapons attached to each extremity of the axle, as among the ancient Persians and Britons. Among the Greeks and Romans chariot races were common.

Charlemagne (or Charles the Great) (747 [742?]-814), king of the Franks and first of the Holy Roman Emperors. Charlemagne was the son of Pepin the Short and grandson of Charles Martel. The Carloringian dynasty takes its name from him, as its greatest representative. With his brother Carloman he succeeded his father (768). In 771 Carloman d., and the free vote of the Franks made Charlemagne sole king. His reign of forty-six years is filled with wars and conquests, as during that time he undertook fifty-two campaigns, the chief of which were against the Lombards, the Saracens, and the Saxons. Desiderius, king of the Lombards, having sought to obtain the succession for the children of Carloman, Charlemagne marched against him, seized all his possessions, and shut the deposed king in a monastery. Charlemagne placed on his own head the famous "Iron Crown of Lombardy" (774). Before leaving Italy he visited Rome and confirmed the donation made by his father to the pope of certain portions of Lombardy. This was the beginning of the papal claims to tem-poral supremacy. In 777 Charlemagne made an expedition against the Saracens in Spain. He was victorious, but on the return march across the Pyrenecs, the rear of his army was attacked by the Gascons and Basques, wild mountaineers of that region, and cut to pieces in the famous Pass of Roncesvalles. Here fell the Christian knight Roland. Charlemagne's most frequent and important campaigns were against the Saxons, one of the few pagan German tribes at this time. He was determined to establish Christianity among them at any cost, but for more than thirty years they re-sisted him. During this struggle Charlemagne caused 4,500 Saxon prisoners to be massacred at one time. They at last yielded. In the year 800 Charlemagne was called to Rome by Pope Leo III to aid him against a hostile faction. The king speedily punished the pope's enemies, and before leaving Rome was magnificently rewarded for his services. During the festivities in the cathedral of St. Peter on Christmas Day, Pope Leo approached the kneeling king, placed on his head a crown of gold, and proclaimed him emperor of the Romans, the consecrated successor of Cæsar Augustus and Constantine. Since 476, when

the Roman Empire fell, the imperial seat had been at Constantinople. Charlemagne's em- king's design. An English army was sent pire, at his death, extended from the Baltic to the Mediterranean, from the Atlantic Ocean to the Danube, including modern France, Germany, Holland, Belgium, Switzerland, Hungary, a little of Spain, and most of Italy. His capital was at Aix-la-Chapelle. This splendid domain only a Charlemagne could rule. After his death it was harassed by the Northmen and by internal dissension, until finally by the treaty of Verdun in 843, it was divided among his three grandsons, Charles, Lothaire, and Lewis, the divisions made laying the foundations, subject to some territorial changes, of the modern nations. France, Italy, and Ger-many respectively. Charlemagne is famed as a statesman and a patron of learning. His laws are in part preserved in decrees called "Capitularies," more than a thousand in number. Commerce was protected, and robbers who preyed upon traveling merchants were severely dealt with. Agriculture was encouraged and improvements taught to the farmers. the emperor's own estates being a praiseworthy model. Charlemagne formed at his court a school for the nobles and their sons. The emperor himself learned to read Latin and even Greek, but could not write legibly. Charlemagne is said to have been of large stature and imposing presence, was regular and temperate. He is charged by some, probably without justice, with immorality. He was married four times and left one son, who became Lewis I, surnamed "Debonair."

Charleroi (shårl-r wä), a town in Belgium, prov. of Hainaut, on both sides of the river Sambre, 20 mi. e.n.e. Mons. It has manufactures of glass, hardware, etc., and woolen stuffs, and in the neighborhood are extensive pits of iron and coal. Pop. 21,879.

Charles, a name frequently used by European monarchs. Of the less important may be mentioned kings of France: Charles the Bald (823-877): Charles the Fat (832-888); Charles the Simple (879-929): Charles the Handsome (1294-1328): Charles the Wise (1337-1380); Charles the Silly (1368-1422): Charles VII, for whose kingdom Joan of Arc fought (1403-1461); Charles VIII (1470-1498): Charles IX (1757-1836). Emperors of Germany: Charles IV (1316-1378): Charles V (1500-1558); Charles VI (1685-1740); and Charles VII (1697-1744). The present reigning monarchs of the name include the kings of Portugal, Roumania, and Wurtemburg.

Charles I (1600-1649), king of England, Scotland, and Ireland, was born at Dunferm-line, Scotland. He married Henrietta Maria, daughter of Henry IV of France, and in 1625 succeeded to the throne. After dissolving three Parliaments he concluded to reign alone. This he did for eleven years, using the arbitrary courts of High Commission and Starchamber as a kind of cover for pure absolutism, and raising money by unconstitutional or doubtful means. The attempts of Charles to introduce an Anglican liturgy into Scotland produced violent tumults, and gave origin to

the famous Covenant in 1638, to oppose the north, but was defeated by the army of the Covenanters, and in 1640 a Parliament was again summoned, which proved to be the famous Long Parliament. The king had on his side the great bulk of the gentry, while nearly all the Puritans and the inhabitants of the great trading towns sided with the Parliament. The first action, the battle of Edgehill (Oct. 23, 1642), gave the king a slight advantage: but nothing very decisive happened till the battle of Marston Moor, in 1644, when Cromwell routed the royalists. The loss of the battle of Naseby, the year following, completed the ruin of the king's cause. Charles at length gave himself up to the Scottish army at Newark (May 5, 1646). He was beheaded before the Banqueting House, Whitehall, meeting his fate with great dignity and composure.

Charles II (1630-1685), king of England, Ireland, and Scotland, son of Charles I and Henrietta Maria of France. Cromwell was all-powerful in England; but Charles accepted an invitation from the Scots, who had pro-claimed him their king July, 1650, and, passing over to Scotland, was crowned at Scone (1651). Cromwell's approach made him take refuge among the English royalists, who, having gathered an army, encountered Cromwell at Worcester, and were totally defeated. Charles escaped to France. On the death of Cromwell the Restoration, effected without a struggle by General Monk, set Charles on the throne after the declaration of Breda, his entry into the capital (May 29, 1660) being made amid universal acclamations. In 1662 he married the Infanta of Portugal, Catharine of Braganza. His reign was characterized by foreign and domestic troubles.

Charles XII (1682-1718), king of Sweden, was b. at Stockholm. On the death of his father, in 1697, when he was but fifteen years old, he was declared of age by the estates. To his jealous neighbors this seemed a favorable time to humble the pride of Sweden. Frederick IV of Denmark, Augustus II of Poland. and the Czar Peter I of Russia concluded an alliance which resulted in war against Sweden. With the aid of an English and Dutch squadron the Danes were soon made to sign peace. but Augustus of Saxony and Poland, and the czar were still in the field. After a long war Charles was defeated at Pultawa. He fied with a small guard and found refuge and an honorable reception at Bender, in the Turkish territory. Here he managed to persuade the Porte to declare war against Russia; but peace was soon procured and the interests of Charles were neglected. He was forced by the Turkish government to leave. Arrived in his own country in 1714, he set about the measures necessary to defend the kingdom, and the fortunes of Sweden were beginning to assume a favorable aspect when he was slain by a cannon ball as he was besieging Frederikshall.

Charles Edward Stuart (1720-1788), called the Young Pretender, grandson of James II,

king of England, son of James Edward and Clementina, daughter of Prince Sobieski, was, b. in 1720 at Rome. In 1742 he went to Paris and persuaded Louis XV to assist him in an attempt to recover the throne of his ancestors. Fifteen thousand men were on the point of sailing from Dunkirk, when the English admiral Norris dispersed the whole fleet. Charles now determined to trust to his own exertions. Accompanied by seven officers he landed on the west coast of Scotland, from a small ship called the Doutelle. Many Lowland nobles and Highland chiefs went over to his party. With a small army thus formed he marched forward, captured Perth, then Edinburgh (Sept. 17, 1745), defeated an army of 4,000 British under Sir John Cope at Prestonpans (September 22), and advancing obtained possession of Carlisle. He now caused his father to be proclaimed king, and himself regent of England; removed his headquarters to Manchester, and soon found himself within 100 mi. of London, where many of his friends awaited his arrival. The rapid successes of the adventurer now caused a part of the British forces in Germany to be recalled. Want of support, disunion, and jealousy among the adherents of the house of Stuart, some errors, and the superior force opposed to him, compelled Prince Charles to retire in the beginning of 1746. The victory at Falkirk (Jan. 28, 1746) was his last. Asa final attempt he risked the battle of Culloden against the Duke of Cumberland, April 16, 1746, in which his army was defeated and entirely dispersed. The prince now wandered about for a long time through the wilds of Scotland, often without food, and the price of \$150,000 was set upon his head. At length, on Sept. 20, 1746, five months after the defeat of Culloden, he escaped in a French frigate. He received a pension yearly from France, and from Spain. Forced to leave France by the terms of the Peace of Aix-la-Chapelle (1748) he went to Italy, and in 1772 married a princess of Stolberg-Gedern, from whom eight years later he was separated. He latterly fell into habits of intoxication, and d. and was buried at Frascati. The funeral service was performed by his only surviving brother, Cardinal York, with whose death in 1807 the Stuart line ended. The cardinal received a pension from Britain of \$20,000 a year till his death.

**Charles Martel'**, ruler of the Franks. was a son of Pepin Héristal. He rendered his rule famous by the great victory which he gained in October, 732, over the Saracens, near Tours, from which he acquired the name of *Martel*, signifying hammer.

**Charles River**, a river in Massachusetts, which flows into Boston harbor, dividing Boston from Charleston.

**Charleston**, Charleston co., S. C., on peninsula between Ashley and Cooper rivers, has one of the finest harbors on the Atlantic coast. It is the port of a naturally rich section which produces abundant cotton and rice. Besides these, great quantities of naval stores and bone phosphate are exported. Railroads: South Carolina; Savannah & Charleston; and the Northwestern. The Santee Canal connects with the Santee River. The manufacturing interests are inferior to the commercial, the most important being in fertillzers and in the preparation of rice. Pop. est. 1897, 61,000.

Charleston, Kanawha co., capital of W. Va., on right bank of Kanawha River at its junction with the Elk, 130 mi. s. by w. of Wheeling. It is the central and distributing point of the valley which yields coal, iron, and hard wood timber. Railroads: Chesapeake & Ohio, and the Kanawha & Ohio. Principal industries: foundries, iron and sawmills, and factories. Pop. est. 1897, over 10,000.

**Charleville** (sharl-vēl), a town, France, department Ardennes. It has wide and regularly built streets, considerable manufactures, and a large trade in coal, iron, wine, etc. Pop. 16,-185.

**Char' lock**, the vulgar name of a common yellow weed in cornfields, also called wild mustard. It also is a common cornfield weed, but having white or straw colored flowers and jointed pods.

Charlotte, Mecklenburg co., N. C., on Sugar Creek, 125 mi. w.s.w. of Raleigh. It is located in the N C. gold region and partially dependent on the mines. Railroads: Wilmington, Charlotte & Rutherford; C. C. & A.; and the N. C. div. of the R. & D. Ry. Principal industries: cotton mills, etc. Pop. est. 1897, 8,000.

Charlotte-Amalie, a town. West Indies, capital of the Island of St. Thomas, one of the Virgin Islands, belonging to the Danes, on the south side of the island. It has an excellent harbor, and is a considerable entrepôt for goods for the neighboring islands. Pop. 12,000.

for the neighboring islands. Pop. 12,000. Charlottenburg (shår-lot'en-burh), a town of Prussia, on the Spree, about 3 mi. from Berlin, with a royal palace and park, and many places of amusement, as also a number of industrial and manufacturing establishments. Pop. 76,859.

Charlottesville, Albemarle co., Va., 97 mi. w. of Richmond. Railroads: Chesapeake & Ohio; and Southern Ry. Industries: woolen mills, knitting factory, and iron foundry. Became a city in 1887. Seat of University of Virginia. Pop. est. 1897, 10,000.

Charlottetown, Queen's co., province of P. E. I. Railroad, P. E. Island R. R., extending e. and w. to chief points of province. Industries: woolen mill, iron foundry, sash and door, soap, butter, and other factories. Surrounding country agricultural. The town was first settled in 1769 and became a city in 1855. Pop. est. 1897, 12,000.

**Charon** (kā'ron), in Greek mythology, the son of Erebus and Night. It was his office to ferry the dead in his boat over the rivers of the infernal regions. He was represented as an old man, with a gloomy aspect, matted beard, and tattered garments.

**Chart**, a hydrographical or marine map, that is a draught or projection of some part of the earth's surface, with the coasts, islands, rocks, banks, channels, or entrances into harbors, rivers, and bays, the points of compass,

soundings, or depth of water, etc., to regulate the courses of ships in their voyages. The term *chart* is applied to a marine map; map is applied to a draught of some portion of land (often including sea also). A *plane chart* is one in which the meridians are supposed parallel to each other, the parallels of latitude at equal distances, and of course the degrees of latitude and longitude everywhere equal to each other. A great number of excellent charts are produced by the hydrographic department of the British admiralty and are sold at a low rate. The U. S. Coast Survey Department produces similar charts. See *Coast Surtext*.

tey. Charter, a written instrument, executed with usual forms, given as evidence of a grant, contract, or other important transaction between man and man. Royal charters are such as are granted by sovereigns to convey certain rights and privileges to their subjects, such as the Great Charter, granted by King John, and charters granted by various sovereigns to boroughs and municipal bodies, to universities and colleges, or to colonies and foreign possessions; somewhat similar to which are charters granted by the state or legislature to banks and other companies or associations, etc.

**Chartres**, a city, France, capital of the department Eure-et-Loire, 49 mi. s.w. Paris. It is a very ancient city. The cathedral. one of the most magnificent in Europe, is rendered conspicuous by its two spires surmounting the height on which the city stands. Manufactures: woolen hosiery, hats, earthenware, and leather; there is a large trade. Pop. 23,108.

**Chartreuse** (chär-treuz) (or Great Chartreuse), a famous Carthusian monastery in Southeastern France, a little northeast of Grenoble, situated at the foot of high mountains, 3,280 ft. above sea level, the headquarters of the order of the Carthusians. It was founded in 1084, but the present building, a huge, plainlooking pile, dates from 1676. The monks of this monastery manufacture the well-known liquor called *Chartreuse*, which owes its special properties to the aromatic plants growing on the Alps.

**Charybdis** (ka-rib'dis), an eddy or whirlpool in the Straits of Messina, celebrated in ancient times, and regarded as the more dangerous to navigators because in endeavoring to escape it they ran the risk of being wrecked upon Scylla, a rock opposite to it.

**Chase**, SALMON PORTLAND (1808–1873), American statesman and jurist, b. in New Hampshire. Having adopted the law as his profession he settled at Cincinnati and acquired a practise there. He early showed himself an opponent of slavery, and was the means of founding the Free-soil party, which in time gave rise to the great Republican party—the power that brought the downfall of slavery. In 1849–55 he was a member of the U. S. Senate, in which he vigorously opposed the extension of slavery into the new territories. In 1855 he was elected governor of Ohio, being re-elected in 1857. In 1860 he was an unsuccessful candidate for the presidency. In 1861 he was nominated secretary of the treasury, and in this post was signally successful in providing funds for carrying on the Civil War. In 1864 he resigned office, and was appointed chief justice of the Supreme Court.

**Chassepot Rifie** (shas-po), a breech-loading rifie, named after its inventor, and adopted as the firearm of the French infantry in 1866, but since given up. It was about 4 lbs. lighter than the needle gun and about 1 lb. lighter than the Martini-Henry rifle.

**Chat**, the popular name of birds of the warbler family. They are small, lively birds, moving incessantly and rapidly about in pursuit of the insects on which they chiefly live. The yellow-breasted chat is a large bird, belonging to the thrush family.

Chateaubriand (shä-tö-bri-än), FRANÇOIS AUGUSTE, VICOMTE DE (1768-1848), a celebrated French author and politician. He went to London and published in 1797 his Essai Historique, which met with but small success. At this time the death of his mother and the accounts of her last moments transmitted to him by his sister helped to effect a certain change in the religious opinions of Châteaubriand, and from a not very profound skeptic he became a not very profound believer. In 1800 he returned to France. and in the following year published his romance of Atala, the scene of which is laid in America. and the year after his celebrated work, Le Génie du Christianisme, which is a kind of brilliant picture of Christianity in an æsthetic and romantic aspect. Style, power of description, and eloquence are the merits of the book rather than any depth of thought; but it carried the author's reputation far and wide, and contributed much to the religious reaction of the time. After a short career as diplomatist under Napoleon, Chauteaubriand made a tour in the East (1806-7), visiting Greece, Asia Minor, and the Holy Land. As the fruit of his travels he published Les Martyrs (1809) and Itinéraire de Paris à Jérusalem (1811). He hailed the restoration of Louis XVIII with enthusiasm, was appointed ambassador to Berlin, and then to London, but in 1824 quarreled with the pre-mier, M. de Villèle, and was summarily dismissed. On the revolution of 1830 he refused to take the oath of allegiance to Louis Phillippe, forfeiting thus a pension of 12,000 francs. At this time his writings were chiefly political, and mostly appeared as newspaper articles, pamphlets, etc. In his later years he wrote several works, but none of the value of his earlier productions.

**Chateau-Lafitte**, famous vineyards, all in the department of the Gironde, France, furnishing the best of the red wines of Bordeaux.

**Chateauroux** (shä-to-rë), a town, France, capital of the department of Indre. It has straight, broad streets, and spacious squares. Cloth, cotton, hosiery, woolen yarn, paper, etc., are made; and there are tanneries and dye works. Pop. 23,924.

**Chatham** (chat'am), a town, naval arsenal, and seaport, England, county Kent, on the Medway, about 341 mi. by rail from London. The importance of Chatham is due to the naval and military establishments at Brompton in its immediate vicinity. The royal dockyard was founded by Queen Elizabeth previous to the sailing of the Armada. It has been greatly enlarged in recent years, and is now about 2 mi. in length, with most capacious docks, in which the heaviest warships can be equipped and sent directly to sea. Building slips, saw mills, metal mills, etc., and all the requisites of a great naval station are here on the largest scale and in the finest order. The military establishments include extensive barracks, arsenal, and park of artillery, hospital, store-houses and magazines. etc. The town is poorly built, but is defended by a strong line of fortifications which also serve as a flank defense for the metropolis. Pop. 59,210.

**Chatham**, a town of Canada, prov. Ontario, on the river Thames, 11 mi. n. of Lake Erie, with manufactures of machinery, iron castings and woolens, and a trade in lumber, etc. Pop. 9,052. **Chatham**, WILLIAM PITT, EARL OF (1708-

1778), one of the most illustrious statesmen of Britain, the son of Robert Pitt of Boconnoc, in Cornwall, educated at Eton and Oxford. He entered Parliament and soon attracted notice as a powerful opponent of Walpole. In spite of the king's dislike Pitt was powerful enough to win a place in the administration, first as vice-treasurer of Ireland, and after-ward as paymaster-general. In 1756 he became secretary of state and the real head of the government. Dismissed in 1757 on account of his opposition to the king's Hanoverian policy, no stable administration could be formed without him, and he returned to power the same year in conjunction with the Duke of Newcastle. It was under this administration and entirely under the inspiration of Pitt that Britain rose to a place among the nations she had not before occupied. Wolfe and Clive, both stimulated and supported in their great designs by Pitt, won Canada and India from the French, and the support the Great Commoner gave Frederick of Prussia contributed not a little to the destruction of French predominance in Europe. The accession of George III brought Lord Bute into power, and Pitt, disagreeing with Bute, re-signed in 1761. In 1766 he strongly advocated conciliatory measures toward the American colonies, and undertook the same year to form an administration, he going to the House of Lords as earl of Chatham. But the ministry was not a success, and in 1768 he resigned. After this his principal work was his appeals for a conciliatory policy toward the colonies. But his advice was disregarded, and the colonies declared themselves independent in 1776. He received a public funeral and a magnificent monument in Westminster Abbey.

**Chatham Islands,** a group of three islands in the South Pacific Ocean, belonging to New Zealand. The soil is in many places fertile, and crops of potatoes, wheat, and vegetables are successfully grown. Cattle and sheep are reared, and thus whaling or other vessels that call are supplied with fresh provisions as well as with water. The present population amounts to only 285. The islands were discovered in 1791.

**Chattahoo' chee**, a river, rising in the Appalachian Mountains in Georgia, and forming for a considerable distance the boundary between Georgia and Alabama. In its lower course, after the junction of the Flint River, it is named the Appalachicola, and is navigable to Columbus in Georgia for steamboats. Total course, about 550 miles.

**Chattanooga**, Hamilton co., Tenn., at foot of Lookout Mountain, on left bank of Tennessee River, 156 mi. s.e. of Nashville. Surrounding country agricultural and mineral. Railroads: N. & C.; W. & A.; A. & C.; Cincinnati Southern; E. T. V. & G.; and Memphis and Charleston. Its industries embrace cotton mills, tanneries, iron, nail, steel, and machine companies, rolling mills. furnaces, railroad car, furniture, and other factories. The wholesale trade is very extensive, having representatives in every branch. Pop. est. 1897. 40.000.

tives in every branch. Pop. est. 1897, 40,000. Chat' terton, THOMAS (1752-1770), a youth whose genius and melancholy fate have gained him much celebrity, was b. at Bristol, England, of poor parents, and educated at a charity school. At the age of fourteen he was apprenticed to an attorney. In 1768, when the new bridge at Bristol was completed, he inserted a paper in the Bristol Journal entitled A Description of the Friars' First Passing over the Old Bridge, which he pretended he had found along with other old manuscripts in an old chest in St. Mary Redcliffe church, Bristol. He also showed his friends several poems of similarly spurious antiquity which he attributed to one Rowley. In 1769 he ventured to write to Horace Walpole, then engaged upon his Anecdotes of Painters, giving him an account of a number of old Bristol painters which was clever enough to deceive Walpole for a time. Dismissed from the attorney's office, he left with his manuscripts for London, where a favorable reception from the booksellers gave him high hopes. For them he wrote numerous pamphlets, satires, letters, etc., but got no substantial return, and his situation became daily more desperate. At last, after having been several days without food, he poisoned himself.

Chau'cer, GEOFFREY (1340-1400), "the father of English poetry." Nothing is known of his education, but in 1350-59 he was a page to Princess Lionel. He tells us himself that in 1359 he bore arms in France and was taken prisoner. He was ransomed next year. In 1367 we find his name as a valet of the king's chamber. In 1367 he received a pension of twenty marks, and between 1370 and 1380 he was employed abroad in seven diplomatic missions. In one of these, in 1372, he was sent to Genoa as a commissioner to negotiate a commercial treaty. In 1374 he was appointed comptroller of the customs on wool at London, also received an annual allowance. In 1377 he was sent to Flanders and France on diplomatic business, and next year to Lombardy. In 1382 he was appointed comptroller of the petty

customs. In 1386 he was returned to Parlia-ment as knight of the shire for Kent, but in the same year he shared the disgrace of his patron, John of Gaunt, was dismissed from his comptrollerships, and reduced to a state of Three years later, comparative poverty. however, he was made clerk of the works, and afterward had other offices and one or two annuities bestowed upon him. In 1399 he got a pension of forty marks from Henry IV, but did not live long to enjoy it. His most cele-brated work, The Canterbury Tales, was written at different periods between 1373 and 1400. It consists of a series of tales in verse (two in prose), supposed to be told by a company of pilgrims to the shrine of St. Thomas (Becket) at Canterbury in 1386. In its pages we get such pictures of English life and English ways of thought in the fourteenth century as are found nowhere else. Besides his great work Chaucer wrote many poems some of which are founded on French or Italian works. He was buried in Westminster Abbey.

**Chaudlère** (shōd-yār), a river of Canada, Quebec province, which rises on the borders of Maine, near the sources of the Kennebec, and flows into the St. Lawrence about 6 mi. above Quebec. The banks of the river are generally steep and rocky, and about 3 mi. above its junction with the St. Lawrence are the Chaudière Falls, about 120 ft. high. On the Ottawa River are two other falls of lesser dimensions known as the Great and the Little Chaudière.

**Chauncey**, ISAAC (1772-1840), American naval officer. He became captain of a merchantship in 1791, and in 1798 entered the U. S. navy as a lieutenant, and was soon promoted. In the War of 1812 he commanded on the lakes, assisted in the capture of Toronto and Fort George, and defeated the British fleet under Sir James Yeo. He afterward commanded in the Mediterranean. For many years he was president of the board of navy commisioners.

**Chaus**(kā'us), a genus of Asiatic and African lynxes or cat-like animals, including the Libyan chaus, and the Caffer-cat. They are fond of the water, and excellent swimmers.

Chautauqua, on Lake Chautauqua in the western part of New York, represents an important educational movement, which originated in 1874 under the leadership of Dr. J. H. Vincent, New York City, and Lewis Miller, Akron, O.; 136 acres of land were laid out in the woods, and trees cut away for cottages and parks. The whole is illuminated with electric lights, has the best of sanitary arrangements, and is abundantly supplied with pure water. The original idea to combine innocent amusements of the summer recreation hours with worthy educational pursuits has been well carried out. Instruction is given on a variety of subjects. A literary and scientific circle was organized in 1872 to promote habits of reading and study at home, among those who had left school, or whose educational ad-vantages had been limited. The Chautauqua circle is a home college for young and old. The course of study adopted requires an aver-

age of forty minutes reading each day for four years. Local circles have been organized in many parts of the world. Graduates receive diplomas. At the first commencement, Aug. 12, 1882, sixteen hundred graduates received diplomas, among the number a lady eighty years old. Every summer there is a sixmonths' session. School of languages, teachers' retreats, missionary institutes, literary and scientific circles, etc., are open. Lectures, concerts, class drills, children's meetings, etc., attract thousands to this sylvan retreat. A model of Palestine, an Egyptian pyramid, an Oriental house, the children's temple, and the art and archeological museum are points of interest. These summer meetings are the inspiration to effort, but the real work is done at the homes.

**Chaux-de-Fonds** (shōd-fon), a town, of Switzerland, in the canton and 9 mi. n.w. of the town of Neufchâtel, in a deep valley of the Jura. The inhabitants are largely engaged in the making of watches and clocks, of which Chaux-de-Fonds and Locle are the chief centers in Switzerland, and in similar branches of industry. Pop. 22,456.

**Cheboygan**, Cheboygan co., Mich., on Straits of Mackinaw and Cheboygan River, 163 mi. n. of Bay City. Railroad, Michigan Central. Industries: tannery, two flouring mills, three iron foundries, nine saw mills, shingle and planing mills, wood works. Surrounding country agricultural. The town was first settled in 1840 and became a city in 1889. Pop. est. 1897, 7,500.

**Check**, a draft or bill on a bank payable on presentation. A check may be drawn payable to the bearer, or to the order of some one named: the first form is transferable without endorsement, and payable to any one who presents it; the second must be endorsed, that is, the person in whose favor it is drawn must write his name on the back of it. Checks are a very important species of mercantile currency wherever there is a well-organized system of banking. The regular use of them for all payments, except of small amount, makes the transfer of funds a mere matter of cross-entrics and transferring of balances among bankers, and tends greatly to economize the use of the precious metals as a currency.

**Checkers**, a game played with "men" on a checkered board, like a chessboard, of sixtyfour black and white squares. It was played in Europe in the sixteenth century, and in 1668 a treatise on the game was published in Paris by Mallet. The Greeks and Romans had a similar game, and the Egyptians are represented on monuments as engaged in some such amusement. The figure represents the board, numbered in the usual method for registering games. Two players, each having a set of twelve men—one set white, the other black (or round and square, or distinguished in any other way)—sit opposite each other, having their men arranged on squares 1 to 12 and 21 to 32 respectively. The men can be placed either on the black or white squares,

# Cheddar

but the whole must be placed on one color only. Whichever color is used, however, the single corners 4 and 29 must be at the players' *left* hand. The object of the game is to clear off the opponent's men altogether from the board, or to so shut them up that they cannot be moved. Generally the black men play first, and as the men are changed each game, the first move becomes alternate. Each player alternately moves one man at a time diagonally forward, always keeping on the same colored squares. When an enemy's man stands in the way, no move can be made unless there be a vacant square immediately beyond, into which the man can be lifted, in which case the man leaped over is "taken." and removed from the



#### Checker Board.

board; and so on, till the game is lost and won, or drawn. When a man on either side has succeeded in making his way to the opposite side of the board, he becomes *crowned*, which is done by putting another man on the top of him, and he can then move in any diagonal direction, but always only one square at a time.

**Ched' dar**, a village, England, county Somerset, 18 mi. s.w. Bristol. The dairies in the neighborhood have long been famous for the excellence of their cheese, which is made from the whole milk, and the whey skimmed off, heated, and added to the curd.

Cheese, one of the most important products of the dairy, is composed principally of casein, which exists in cows' milk to the extent of about 3 or 4 per cent., fat and water. It is made from milk, skimmed wholly, partially, or not at all, the milk being curdled or coagulated, and the watery portion or whey separated from the insoluble curd, which being then worked into a uniform mass, salted and pressed in a vat, or mold forms cheese, but requires to be cured or ripened for a time. The coagulation of the milk may be effected either by adding an acid as in Holland, or sour milk as in Switzerland, or rennet as usual in Britain and this country. There are a great many varieties of cheese, of which the most notable are Stilton. Cheshire, Cheddar, Dunlop, among British; and Parmesan, Gruyère, Gorgonzola, Gouda,

# Chemistry

among foreign ones. In the U. S. immense quantities of cheese are made. Large factories are devoted to the manufacture. Other kinds are known as sour-milk, skimmed milk, cream. sweet-milk, etc., cheese. Sheep's and goat's milk cheese are also made.

**Cheese Fiy**, a small black dipterous insect bred in cheese, of the same family to which the house fly, blow fly, etc., belong. It has a very extensible ovipositor, which it can sink



Cheese Hopper. a.—larva, natural size; b.—larva, magnified, preparing to spring; c.—perfect insect, natural size; d.—magnified.

to a great depth in the cracks of cheese, and lay its eggs there. The maggot, well known as the cheese hopper, is furnished with two horney claw-shaped mandibles, which it uses both for digging into the cheese and for moving itself, having no feet. Its leaps are performed by a jerk, first bringing itself into a circular attitude, when it can project itself twenty to thirty times its own length.

**Che-Klang**, a maritime province of China, including the Chusan Archipelago: area 39,150 sq. mi.; pop. 11,588,692. It is traversed by the Grand Canal, and has as its principal ports Ningpo and Hang-Chow-Foo, the capital. Staple exports, silk and tea.

**Chelsea** (chel'sē), a suburb of London, England, chiefly distinguished for containing a royal military hospital, originally commenced by James I as a theological college, but converted by Charles II for the reception of sick, maimed, superannuated soldiers. Pop. 96,272.

**Chelsea**, Suffolk co., Mass., separated from East Boston by Mystic River. Railroad, Eastern & Grand Junction. Principal industries: foundry and machine ship products, curried leather, cotton goods, tobacco, rubber, linseed oil, woolens, brushes, soap, mattresses, and paper box manufactories. Contains a U.S. marine hospital, naval hospital, and U.S. powder magazine. Pop. est. 1897, 28,000.

**Cheltenham** (chel'tn-am), a fashionable watering place in England, in the county of Gloucester, within the shelter of the Cotswold Hills. It grew rapidly into a place of fashionable resort after the discovery of its saline, sulphuric, and chalybeate springs in 1716, to which, in 1788, George III paid a visit. Pop. 42,914.

**Chemical Rays**, a not very appropriate name given to the blue and violet rays of the spectrum, and also the non-luminous rays at the violet end of the spectrum, which have a peculiarly powerful chemical effect on silver compounds.

**Chemistry**, the science which treats of the nature, laws of combination. and mutual ac-

## Chemistry

tions of the minute particles of the different sorts of matter composing our universe, and the properties of the compounds they form. As a science it is entirely of modern origin, in its earliest phases being identical with alchemy, the great object of which was the discovery of the philosopher's stone. In this pursuit most minerals, especially such as presented the characters of metallic ores, were subjected to numerous experiments, and many important isolated discoveries were made by Basil Valentine, Raymond Lully, Paracelsus, Van Helmont, and others. But during the latter part of the seventeenth century the belief in alchemy was greatly on the wane, and just at its close the German chemist Becher threw out certain speculations regarding the cause of combustion, which were afterward taken up and extended by Stahl in the "phlogistic theory," and constitute the first generalization of the phenomena of chemistry, though the theory itself was diametrically opposed to the truth. About the middle of the last century Doctor Black made his great discovery of a gas differing from atmospheric air, rapidly followed by that of a number of other gases by Cavendish, Rutherford, Priestley, Scheele, etc.; and the discovery of oxygen by the two last-named chemists afforded to Lavoisier the means of revolutionizing and systematizing the science. By a series of experiments he showed that all substances, when burned, unite with oxygen, and that the weight of the products of combustion is exactly equal to that of the combustible consumed and of the oxygen which has disappeared. The application of this theory to the great majority of the most important chemical phenomena was obvious, and the Stahlian hypothesis disappeared from the science. A yet more important step was the discovery by Dalton of the laws of chemical combination. His theory was immediately taken up by Berzelius, to whose influence and careful determination of the chemical equivalents of almost all the elements then known its rapid adoption was mainly due. To Berzelius we owe almost all the modern improvements in the methods of analysis, and to Sir H. Davy the foundation of electro-chemistry. Of late years every branch of the science has advanced, but the most extraordinary progress The inhas been made in organic chemistry. vestigations of chemists have shown that the great majority of the different substances found at the surface of the earth can be broken up into several substances of less complicated nature, which resist all further attempts to decompose them, and appear to consist of only one kind of matter. These substances, by union of which all the different sorts of known matter are built up, are about seventy in number, and are called the chemical elements. The list (given below) includes such substances as gold, iron, oxygen, hydrogen, carbon, calcium, etc. When any two or more of these elements are brought in contact, under the proper conditions, they may unite and form chemical compounds of greater or less complexity, in which the constituents are held in union by a

form of energy which has received the name of ohemical affinity. This affinity is characterized by its acting between dissimilar particles, and producing a new kind of matter, readily distinguishable from either of the substances combining to form it, and which cannot be again separated into its elements by merely mechanical processes.

Laws of Combination.—1, Chemical com-bination takes place between the smallest particles of matter and at inappreciable distances. Thus fragments of phosphorus and iodine may be placed near each other, but do not combine until brought into actual contact. 2, Chemical combination invariably There are effects a change in all bodies. changes of state, temperature, color, volume, taste, smell, etc. 3, Chemical combination takes place with different degrees of force in different bodies. The more unlike two bodies are the greater the violence with which they combine. 4, Chemical combination is much affected by other forces. Heat, light, electricity, mechanical force, etc., may either accelerate or retard chemical combination. 5, All substances, elementary and compound, combine together in fixed and definite proportions by weight. 6, When bodies combine in more than one proportion their other combining proportions are simple multiples of the lowest. Thus, 28 parts of nitrogen combine with 16 parts of oxygen to form nitros oxide, while 28 parts of the former and 32 of the oxygen produce nitric oxide, and an additional 16 of oxygen forms nitric trioxide, etc. 7, Gases combine in fixed and definite proportions by volume as well as by weight. If one volume of each gas be combined together, two volumes of the gaseous compound result. If more than one volume of each combine together, the new compound only occupies two volumes, however great the aggregate number of volumes is before combination takes place. 8, The combining proportions of compounds are the sum of the combining proportions of their constituent elements.

The atomic weight of any element is now assumed to be the smallest quantity which can enter into or be expelled from combination, one part of hydrogen being taken as the standard.

Nomenclature.—The names employed by the old chemists were generally derived from some property of the body or indicated the mode in which it was prepared, and sometimes the substance from which it was obtained. Soon after the introduction of Lavoisier's system, the French Academy of Sciences appointed a committee to improve it; and the chief merit of the one introduced is due to Guyton Morveau. The names applied to the elements were as far as possible derived from some conspicuous property they possess. An attempt has been made to make the name express also the class to which the substance belongs. Thus all the metals (except those long known) are made to terminate in um, as potassium, barium, etc.: and the substances allied to chlorine have a similar termination to it. The nomenclature

## Chemistry

of compounds was based on the existence of two classes of substances opposed to one another in their properties, and known as acids and bases. All the bases known at the close of the last century were oxygen compounds, and they were known by the general name of oxides. The compounds of chlorine, iodine, and bromine, and subsequently those of sulphur. carbon, boron, and silicon, though really belonging to a different class, were called chlorides, iodides, bromides, sulphides, etc. After the atomic theory came into use, the term oxide was confined to a compound containing one atom of oxygen in combination with one of the other elements. The compound containing two atoms of oxygen became a dioxide, that with three a trioxide, and so on; the numeral prefix always expressing the number of atoms of oxygen. So also we speak of a protochloride and bichloride, a protosulphide and bisulphide. So also there are a number of oxides containing two equivalents of metal to three of oxygen; such compounds are called sesquioxides. Of late years it has been found preferable to use names of less precision, and to distinguish only between the larger and smaller propor-tions of oxygen. Thus there are two oxides of iron possessing basic properties, which are called respectively ferrous, and ferric oxide, the termination in ous being used in all cases for the compound containing the smaller, and that in *ic* for the one containing the larger quantity of oxygen, the Latin name of the element being usually employed. Both systems, however, are still in common use.

The nomenclature for compounds possessing acid instead of basic properties, has its origin in part in the belief entertained by chemists in the last century that all acids were oxygen compounds, and that it was therefore unnecessary to indicate the existence of oxygen in them, as the word acid sufficiently did so. Thus sulphur forms two different acid compounds, one with a smaller proportion of oxygen than the other, called respectively sulphurous and sulphuric acids; and similarly we have chlorous and chloric acids, etc. The contrivers of the present nomenclature did not provide for more than two acid compounds of any one element, that being the largest number then known. But since that time it has been found that there may be four or five such compounds necessitating the use of a distinctive prefix. In the case of chlorine and oxygen, after the name chloric acid had been made use of, another acid containing a larger quantity of oxygen was discovered, for which the name of hyperchloric acid, usually short-ened into perchloric acid, was devised. Further observation, however, showed that there were many powerful acids which contained no oxygen, but that hydrogen was invariably present, and it became necessary to distinguish those which contained hydrogen only. Accordingly we have hydrochloric acid, a compound of hydrogen and chlorine, in contrast with chloric acid, a compound of hydrogen, chlorine, and oxygen; and hydrosulphuric acid, a compound of hydrogen and sulphur. in

# Chemistry

contrast with sulphuric acid, a compound of hydrogen, sulphur, and oxygen.

The names of acids were formed in order to enable chemists to have simple designations for salls, a class of bodies produced when a metal takes the place of the hydrogen of an acid. Thus the termination in all expressed the fact that the salt is derived from an acid whose name terminates in *ic*, and the salts of acids whose names end in ous have their termination in *ide*. Very frequently two salts, generally of the same acid, combine to form what is usually known as a double salt, as, for instance, potassium suphate and zinc sulphate combine, and the compound is called the zinco-potassic sulphate.

This system of nomenclature, which fulfilled the requirements of chemistry at the time it was devised, became less and less convenient as more complex compounds were discovered, and many attempts have been made to modify and extend it. These attempts, however, have uniformly failed to meet the approval of chemists.

Symbols.— Very soon after the publication of Dalton's views Berzelius introduced a system of symbols by which the composition of the more complex chemical compounds can be represented with much greater precision than any nomenclature admits of; and the plan proposed by him, though with some modifications, is now universally accepted. Every element is represented by a symbol, which is the initial letter of its Latin name. Where several elements have the same initial a small letter is attached to it for the sake of distinction. These symbols are further understood in all cases to represent an atom of each element. The symbols of compounds are formed by the juxtaposition of those of their elements. Thus—

H Cl,.....Hydrochloric acid, Ba S,.....Baric sulphide,

express the fact that these compounds contain single atoms of their constituents; that hydrochloric acid, for example, is a compound of 1 part of hydrogen and 35.5 of chlorine; and baric sulphide of 137 parts of that metal and 32 of sulphur. When more than one atom of an element exists in any compound this is indicated by a small figure placed after its symbol, and a little below. Where it is necessary to express more than one atom or molecule of the compound this is done by prefixing to the symbol a large number written on the line. By a systematic arrangement of the symbols in each compound an attempt is made to indicate to a certain extent their chemical functions. Thus, in an acid, the hydrogen, which may be replaced by a metal, begins the formula of the compound.

The symbols are also very advantageously used to express the changes which occur during chemical action, and they are then written in the form of an equation, of which one side represents the condition in which the substances exist before the change, the other the result of the reaction.

# Chemistry

Atomicity.-When an atom of chlorine, weighing 35.5, is brought in contact with hydrogen it is found to combine only with one atom of that substance. When an atom of oxygen, weighing 16, comes in contact with hydrogen, however, it combines with two parts, or two atoms, of that element. An atom of nitrogen. weighing 14, combines only with three parts or three atoms of hydrogen. These elements or three atoms of hydrogen. are therefore said to possess different atomicities; hydrogen is called a monatomic element, oxy-With gen biatomic, and nitrogen triatomic. reference to this fact, therefore, the elements have been divided into several classes according to the number of atoms of hydrogen to which they are equivalent, or with which they can combine, and they are described as monads, diads, triads, etc. No physical explanation of the cause of this peculiarity of the different elements has yet been obtained. This variation in atomicity has been accounted for by supposing that two atomicities in an element can neutralize or saturate one another.

Molecules.—The molecule of a compound is the quantity of it which exists in two gaseous volumes, so that we do not speak of the atom of a compound, but of its molecule, that being the smallest quantity of a compound which can be obtained in the separate state. This and other considerations have led to the further hypothesis, that atoms never exist in a separate state, but that, as soon as they are separated from compounds, they enter into combination with one another.

Compound Radicals.—In every perfect molecule all the bonds of the elements which combine are saturated, and the affinities being perfectly satisfied, the molecule has no disposition to combine directly with any other substance; but if several elements are combined in such a manner that one or more bonds remain unsatisfied, the compound so produced has in general very powerful affinities, and unites readily with any substance capable of saturating its uncombined bond.

Classification of Compounds.—The properties of chemical compounds may be classified not merely under the head of the particular elements they contain, but also according to their special chemical functions. The advantages of the latter method were early recognized, and the distinction between acids and alkalies dates back to a period long previous to the ascertainment of their true nature. An acid is now described as a compound containing a certain quantity of hydrogen, easily replaceable by a metal when it comes in contact with it either in the free state or as an oxide.

Bases are compounds which, by reacting on acids, yield salt. The most important bases are oxides of metals, and they are divided into several sections, of which the most important are the alkalies. These substances are the hydrates of the so-called alkaline metals, and may be compared to water in which an atom of hydrogen is replaced by an atom of metal. Most of the bases, excepting the alkalies, are insoluble in water, and without any effect on vegetable colors. Another class of

### Chemulpo

bases of great importance is typified by ammonia.

Sulphides are compounds of the metals with sulphur, and form a very important class of compounds. They are obtained either by heating the metals with sulphur in proper proportions, or by passing a current of hydrosulphurlc acid gas through a solution of a salt. They exist abundantly in the mineral kingdom, and form some of the most important ores. Some of the sulphides are capable of acting as bases and others as acids, and by combination a class of salts, usually distinguished as sulphur salts. can be obtained. The greater part of the sulphides are insoluble in water, and some of them possess extremely fine colors, and are used as paints.

Organic and Inorganic Chemistry.-Organic chemistry is that branch of the science which treats of the compounds existing in plants and animals, or which may be produced from substances found ready formed in their tissues. It was at first believed that these compounds were peculiar in their constitution, quite distinct in their chemical relations, and produced by what was called vital affinity. The discovery by Wöhler, however, that urea could be produced artificially from purely mineral substances entirely altered this view; and since then the artificial production of many organic compounds has practically annulled the distinction between organic and inorganic chemistry, except as a matter of convenience. Organic chemistry is now most commonly defined as the chemistry of the carbon compounds, for that element is found in every substance which can be extracted from plants and animals, in combination with hydrogen, oxygen, nitrogen, and less frequently with sulphur and phos-phorus. These elements are so combined as in many cases to form compounds of extreme complexity, the constitution of some of which is still a matter of much difference of opinion among chemists; but the constitution of the simpler organic compounds is now thoroughly understood

**Chemnitz** (hem'nits) the principal manufacturing town in the kingdom of Saxony, on the Chemnitz. The principal manufactures are white and printed calicoes, ginghams, handkerchiefs, woolen and half-woolen goods, etc. There are also extensive cotton spinning mills, and mills for the spinning of combed wool and floss silk: dye works, print works, bleach works, chemical works: large manufactures of cotton hose, etc. The manufacture of machinery also has now become important. Pop. 110,817.

**Chemosh** ( $k\bar{e}$ ' mosh), the national god of the Moabites, who were on that account called "the people of Chemosh." At an early period the same deity appears too as the national god of the Ammonites, though his worship seems afterward to have given place to that of Moloch, if Moloch be not merely another name for the same deity. The worship of Chemosh was even introduced among the Hebrews by Solomon.

**Chemulpo** (chē-mul'pō), one of the three treaty ports of Corea, exporting beans, gin-

## Chenab

seng, etc., and importing European and American manufactures.

**Chenab** (chen-àb'), a river in Hindustan, one of the five rivers of the Punjab. It rises in the Himalayan ranges of Kashmir, and entering the Punjab near Sialkot, flows in a southwesterly direction till it unites with the Jehlam; length about 800 mi.

**Chency**, CHARLES EDWARD, American clergy man, b. in Canandaigua, N. Y., Feb. 12, 1836. He graduated at Hobart College in 1857, and entered the Episcopal ministry. In 1873 he assisted in organizing the Reformed Episcopal Church of which he was made bishop.

**Chenille** (she-nil'), a sort of ornamental fabric of cord-like form, made by weaving or twisting together warp threads with a transverse filling or weft, the loose ends of which project all round in the form of a pile. Chenille carpets have a weft of chenille, the loose threads of which produce a fine velvety pile.

**Cheops** (kē-ops), the name given by Herodotus to the Egyptian despot whom the Egyptians themselves called Khufu. He belonged to the rulers who had for their capital Memphis; lived about 2800-2700 B. c., and built the largest of the pyramids. According to Herodotus he employed 100,000 men on this work constantly for 20 years.

**Chephren** (kef'ren) (or Cephren), was the successor of Cheops as king of Egypt, and the builder of the second pyramid. His name is properly Khafra.

**Cher** (shār), a river of Central France, a tributary of the Loire, which it enters near Tours; length 200 mi.

**Cher** (shar), a department of Central France, named from the river Cher, and formed from part of the old provinces of Berry and Bourbonnais; area 2,770 sq. mi.; capital Bourges. The forests and pastures are extensive. More grain and wine are produced than the demands of the inhabitants require. The preparation and manufacture of iron, called Berry iron, is the principal branch of industry. The department is divided into three arrondissements. Pop. 355,349.

**Cherbuliez**, VICTOR, French author, b. at Geneva, of French parentage, in July, 1829; studied at Paris, Bonn, and Berlin, and wrote romances of notable excellence. On Nov. 8, 1881, he was elected a member of the French Academy.

**Cheribon** (sher'i-bon), a seaport in the island of Java, capital of the province of the same name. The province lies on the coast toward the northwest, produces coffee, timber, arecanuts, indigo, and sugar, and has about 770,-000 inhabitants. The town lies in a deep bay on the north coast, and is the residence of a Dutch governor. Pop. 11,000.

**Cherimoy er** (cher-), a fruit, native of South and Central America, allied to the custard apple. It is heart-shaped, with a scaly exterior, and numerous seeds buried in a delicious pulp. Both flowers and fruit emit a pleasant fragrance. This fruit is now cultivated in various tropical regions.

Cherokees', a tribe of North American In-

### Chersonesus

dians, occupying an allotted region in the Indian Territory. Their old seats were in Georgia, Alabama, Mississippi, and Tennessee. The Cherokees are the most enlightened of the Indian tribes, have an alphabet, printed books and newspapers in their own language, live in well-built villages, and have an excellent school system. Their numbers are about 20,000.

**Cherry**, a fruit tree of the prune or plum tribe, very ornamental, and therefore much cultivated in shrubberies. It is a native of most temperate countries of the northern hemisphere, and in Britain is quite common in the wild state, besides being cultivated for its fruit. The cultivated varieties probably



Common Cherry; a.-blossom.

belong to two species. They are numerous, as the red or garden cherry, the red heart, the white heart, the black cherry, etc. The fruit of the wild cherry is often as well flavored, if not quite so large, as that of the cultivated It is said that this fruit was varieties. brought from Cerasus, in Pontus, to Italy, by Lucullus about B.c. 70, and introduced into Encland by the Romans about A.D. 46. The cherry is used in making the liquors Kirschwasser and Maraschino. The wood of the cherry tree is hard and tough, and is very serviceable to turners and cabinet makers. An ornamental but not edible species is the bird cherry. The wild cherry of this country is a fine large tree, the timber of which is much used by cabinet makers and others, though the fruit is rather astringent.

**Cherry Laurel**, the common name of an evergreen shrub, a native of Asia Minor, but now naturalized in America and common in shrubberies. It is commonly called laurel, but must not be confounded with the sweet bay or other true species of laurel. The leaves yield an oil nearly identical with that got from bitter almonds. The distilled water (called "laurel water") from the leaves is used in medicine. The Portugal laurel is another species.

**Chersonesus** (ker-so-nē'sus) (Greek, "a peninsula"), anciently a name applied to several peninsulas, as the Cimbrian Chersonesus, now Jutland, etc., the Tauric Chersonesus, the

pennusula formed by the Black Sea and the Sea of Azoff—the Crimea.

**Cherusci** (ke-rus'ci), an ancient German tribe whose territory probably was situated in that part of Germany lying between the Weser and the Elbe, and having the Harz Mountains on the north and the Sudetic range on the south. This tribe was known to the Romans before 50 B. C., and occasionally served in the Roman armies. But when Varus attempted to subject them to the Roman laws they formed a confederation with many smaller tribes, and having decoyed him into the forests, destroyed his whole army in a battle which lasted three days, and in which he himself was slain (A. D. 9). Upon this the Cherusci became the chief object of the attacks of the Romans.

Germanicus marched against them, but though successful in several campaigns did not obtain any permanent advantages. Subsequently the Cherusci were overcome by the Chatti, and latterly they were incorporated among the Franks.

**Ches' apeake Bay**, a spacious bay of North America, in the states of Virginia and Maryland. Its entrance is between Cape Charles and Cape Henry, 16 mi. wide, and it extends 180 mi. to the northward. It is from 10 to 30 mi. broad, and at most places as much as 9 fathoms deep, affording many commodious harbors and a safe and easy navigation. It receives the Susquehanna, Potomac, and James rivers.

**Cheshire** (chesh'ir) (or Chester), a maritime county and county palatine of England, area 657,123 acres. Minerals abound, especially rock salt and coal, which are extensively worked. Cotton manufacture is carried on at Stockport, Stalybridge, and the northeastern district, shipbuilding at Birkenhead and other places. Principal towns, Chester, the county town,

towns, Chester, the county town, Macclesfield, Stockport, Birkenhead, and Stalybridge. Pop. 730,052.

Chess, a well-known game of great antiquity and of Eastern origin, having probably arisen in India, and thence spread through Persia and Arabia to Europe. The name itself as well as many of the terms used in the game are clearly of Eastern origin. The game is played by two persons on a *board* which con-sists of sixty-four squares arranged in eight rows of eight squares each, alternately black and white. Each player has sixteen men, eight of which, known as pauns, are of the lowest grade; the other eight, called pieces, are of various grades. They are, on each side, king and queen; two bishops, two knights, and two rooks or castles. The board must be placed so that each player shall have a white square to his right hand. The men are then set upon the two rows of squares next the players; the pieces on the first, the pawns on the second row, leaving between each side four unoccu-pied rows. The king and queen occupy the

central squares facing the corresponding pieces on the opposite side. The queen always occu-pies her own color, white queen on white square, black on black. The two bishops occupy the squares next the king and queen; the two knights the squares next the bishops; the rooks the last or corner squares. The pawns fill indiscriminately the squares of the second or front row. The men standing on the king's or queen's side of the board are named respectively king's and queen's men. Thus king's bishop or knight is the bishop or knight on the side of the king. The pawns are named from the pieces in front of which they stand; king's pawn, king's knight's pawn, queen's rook's pawn, etc. The names of the men are rook's pawn, etc. The n contracted as follows: King, K.; King's

Black

White

Bishop, K. B.; King's Knight, K. Kt.; King's Rook, K. R.; Queen, Q.; Queen's Bishop, Q. B.; Queen's Knight, Q. Kt.; Queen's Rook, Q. R. The pawns are contracted; K. P., Q.P., K. B.P., Q. Kt.P., etc. The board is divided, inversely from the position of each player, into eight rows and eight files. Counting from White's right hand to his left, or from Black's left to his right, each file is named from the piece which occupies its first square, and counting inversely from the position of each player to that of the other, the rows are numbered from 1 to 8. At White's right hand corner we have thus K. R. square; immediately above this K. R. 2; and so on to K. R. 8, which completes the file; the second file begins with K. Kt. square on the first row, and ends with K. Kt. 8 on the eighth. White's K. R. 8 and K. Kt. 8 are thus Black's K. R. square and K. Kt. square, and the moves of each player are described throughout from his own position, in inverse order to the moves of his opponent.

In chess all the men capture by occupying

the position of the captured man, which is removed from the board. The ordinary move of the Paun is straight forward in the same file; a pawn never moves backward. The first time a P. is moved it may be played forward one square or two; afterward only one square at a time. But in capturing an adverse piece the P. moves diagonally to occupy the position of the captured man. The player may choose any piece except the king, but the queen, the most valuable piece, is generally the piece chosen. This is called queening a pawn, and the player may thus have several queens on the board. The Rook.—The moves of the pieces are not, like those of the pawns, limited to a single direc-The R. moves in any direction and for tion. any distance that is open along either the particular row or the file on which it happens to stand. It can, of course, capture any ob-structing man and occupy its place. The Bishop.—The B.'s, like the R.'s, are unlimited The in range, and move either backward or forward, but their direction is diagonal, and they can never change the color of their square. The Queen.—The Q. combines the moves of the R. and B. She is the most powerful plece on the board, and can move to, or capture at, any distance or direction in a straight line. The King .- The K. is at once the weakest and most valuable piece on the board. In point of direction he is as free as the queen, but for distance he is limited to the adjacent squares. Standing on any central square he commands the eight squares around him and no more. besides his ordinary move the K. has another by special privilege, in which the R. partici-pates. Once in the game, if the squares between K. and R. are clear, if neither K. nor R. has moved, if K. is not attacked by any hostile man, and if no hostile man commands the square over which K. has to pass. K. may move two squares towards either K.R. or Q.R., and R. in the same move may occupy the square over which K. has passed. This is called *castling*. The Knight.—The Kt., unlike the other pieces, never moves in a straight line. His move is limited to two squares at a time, one forward or backward, and one diagonally, and he can leap over any man occupying a square intermediate to that to which he intends to go. The Kt., like the K., when on a central square commands eight squares, but they are at two squares' distance, and all in an oblique direction. All captures in chess are optional.

The definite aim in chess is the reduction to surrender of the opposing king. The K. in chess is supposed to be inviolable, that is, he cannot be taken, he can only be in such a position that if it were any other piece it would be taken. Notice of every direct attack upon him must be given by the adversary saying *check*, and when the K. is attacked all other plans must be abandoned, and all other men sacrificed, if necessary, to remove him from danger, cover the attack, or capture the assailant. It is also a fundamental rule of the game that the K. cannot be moved into check. When the K. can no longer be defended on being checked by the adversary, either by moving him out of danger, or by interposing, or by capture, the game is lost, and the adversary announces this by saying *checkmate*. When, by inadvertence or want of skill, the player having the superior force blocks up his opponent's K. so that he cannot move without going into check, and no other man can be moved without exposing him, the player, reduced to this extremity, cannot, without violating the fundamental rule referred to, play at all. In such a case, the one player being unable to play and the other out of turn, the game is considered *drawn*, that is, concluded without advantage to either player. The laws of the game must be sought in some special manual. Perhaps the best code is that given in Stauton's *Chess Prazis*.

**Chester**, an English borough, county town of Cheshire, situated on the Dee, about 16 mi. from Liverpool. It is a bishop's see, and contains an old and interesting cathedral recently restored. Chester has manufactories of lead pipes, boots and shoes, iron foundries, chemical works, etc.

**Chester**, Delaware co., Pa., on Delaware River, 131 mi. s. of Philadelphia. Railroads: P. W. & B.; B. & O.; P. & R. Industries: shipyards, iron foundry, woolen mills and cotton mills, steel cos., dye-wood mill, brick yards, planing and sash mills, box and other factories. Surrounding country agricultural and quarries. The town was first settled in 1644, and in 1699 William Penn chartered borough of Chester. It became a city in 1866. Pop. est. 1897, 32,000. **Chesterfield**, a town of Derbyshire, England.

**Chesterfield**, a town of Derbyshire, England. The principal manufactures are ginghams, lace, and earthenware, but a majority of the working classes are employed in connection with the collieries, iron mines, and blast furnaces of the vicinity. Pop. 13,242.

Art in the conteries, from mines, and blast furnaces of the vicinity. Pop. 13,242. **Chesterfield**, PHILP DORMER STANHOPE, EARL OF (1694–1773), an English statesman and author. He succeeded his father in the title in 1726, sat in the House of Lords, and acquired some distinction as a speaker. In 1728 he was ambassador to Holland, in 1744 lord lieutenant of Ireland, a position which he occupied with great credit, and in 1746 secretary of state: but in 1748 retired from public affairs. His letters to his godson with a memoir by the Earl of Carnarvon were published in 1889. These writings combine wit and good sense with great knowledge of society.

**Chestnut** (or Chesnut), a genus of plants, allied to the beech. The common or Spanish chestnut is a stately tree, with large, handsome, serrated, dark-green leaves. The fruit consists of two or more seeds enveloped in a prickly husk. Probably a native of Asia Minor, it has long been naturalized in Europe, and was perhaps introduced into Britain by the Romans. The tree grows freely in U.S., and may reach the age of many centuries. Its fruit ripens only in some cases. Chestnuts form a staple article of food among the peasants of Spain and Italy. The timber of the tree was formerly more in use than it is now;

### Chettik

it is inferior to that of the oak, though very similar to it in appearance, especially when old. Two American species of chestnuts have edible fruits. The former is often regarded as identical with the European tree. The name of Cape Chestnut is given to a beautiful tree of the rue family, a native of Cape Colony. The Moreton Bay Chestnut is a leguminous tree of Australia, with fruits resembling those of the chestnut. The water-chestnut is the water



Branchlet, with Catkins, of Common Chestnut (Castanea vulgaris). a.-fruit; b.-seed.

caltrop. The horse-chestnut is quite a different tree from the common chestnut.

**Chettik** (chet'tik), a tree of Java, yielding a very virulent poison called by the same name, more powerful than that obtained from the upas tree, and owing its virulence to the strychnine it contains.

**Chevalier** (chè-và-lya), MICHEL (1806-1879), a noted French economist. He became a councilor of state (1838), professor of political economy in the Collége de France (1840), member of the Chamber of Deputies (1846), and member of the Institute (1851). By this time he had written a number of works: Lettres sur l'Amerique du Nord; Des Intérêts Matériels en France; Essais de Politique Industrielle; Cours d' Economie Politique, etc. He was known as a strong advocate of free trade, and as a specialist on questions of currency. Along with Cobden and Bright he had a great part in the commercial treaty of 1860 between France and Britain.

**Che'viot Hills**, a range on the borders of England and Scotland, stretching s.w. to n.e. for above 35 mi.; culminating point, the Cheviot. 2,688 ft.

**Cheviot Sheep**, a variety of sheep, taking their name from the well-known Border

# Chicago

mountain range, noted for their large carcass and valuable wool, which qualities, combined with a hardiness second only to that of the black-faced breed, constitute them the most valuable race of mountain sheep in the kingdom. The fleece weighs from 3 to 4 lbs., and the carcass of ewes varies from 12 to 16 lbs. per quarter, that of wethers from 16 to 20 lbs.

**Chevreul** (she-vreul), MICHEL EUGENE (1780-1880), a French chemist. In 1813 he became professor of physical science in the Charlemagne Lyceum, in 1824 director of dyeing in the Gobelins manufactory, in 1830 professor of chemistry in the Collége de France. In 1870 he retired. He has written various works on chemistry and dyeing, and an important work on the *Principles of Harmoy and Contrast* of Colors, translated into English.

Cheyenne, Laramie co., Wyo., on Crow Creek. It is the center of the great beef-growing region, and the shipping point for cattle to eastern markets. Railroads: U. P.; Denver Pacific & Colo. Central; Cheyenne & Burlington; and others. Principal industries: railroad machine and repair shops, breweries, book-binderies, saddle and harness, carriage and wagon, woodwork and clgar factories. Near the city are a number of more or less noted silver mines. Pop. est. 1897, 18,000.

**Chiapas** (chi-ä' pås), a state of the Mexican Confederation; area 16,048 sq. mi. It is in many parts mountainous, is intersected by several considerable streams, and covered with immense forests. The valleys are fertile, and produce much maize, sugar, cacao, and cotton, etc. But trade is quite undeveloped on account of the lack of roads. The capital is San Cristobal. Pop. 209,362.

**Chica** (chē'ka), a red coloring matter which the Indians on the upper parts of the Orinoco and the Rio Negro prepare from the leaves of a plant native to that region called *Bignonia Chica*, and with which they paint their skin, in order to be better able to resist the rays of the sun.

Chica (chē'kà), a kind of beer made from maize, in general use in Chile, Peru, and elsewhere in the mountainous regions of South America. The usual method of preparing it is to steep the maize till it begins to grow, when it is exposed to dry in the sun. The malt thus prepared is then ground, mixed with warm water and left to ferment. The beer, when ready, has a dark yellow color, and a pleasant and somewhat bitter and sour taste, and is very intoxicating. Sometimes the Indians instead of grinding the malt chew it, and this variety of the liquor is considered the best. It is the national drink of the Indians, and consumed by them in great quantities.

**Chicago**, Cook co., Ill., metropolis of the Northwest, situated at the foot of Lake Michigan, extending from Evanston on the north to the Indiana State Line on the south. The site was visited by Père Marquette in 1673. Fort Dearborn was built there in 1804, and evacuated in 1812, on the occasion of the memorable massacre by the Indians, and re-

built in 1816. For many years Chicago was the leading Indian trading post in the West. In 1833 the inhabitants, who had been for a number of years gathering there, organized a village board, and by 1835 the population had reached 3,265. A city charter was obtained in 1837, and William B. Ogden was elected the first mayor, 709 votes being cast. The commerce of the great lakes grew enormously, and, together with the construction of the Illinois and Michigan Canal, gave the young city its first impetus. Thus far it had progressed in its career without the aid of rail-roads. But by the year 1850 about 30 mi. of the Galena & Chicago Union Railroad (the present Chicago & Northwestern) had been built, and the population had bounded up to 20,000. The first railway from the East to enter the city was the Lake Shore & Michigan Southern in 1852. Since that period the railway system, of which Chicago is the center, has developed into colossal proportions, so that in 1897 the number of railways centering in or directly tributary to Chicago, were as follows: *Eastern:* Baltimore & Chicago; Chicago &

Eastern: Baltimore & Chicago; Chicago & Erie; Chicago & Eastern Illinois; Chicago & Grand Trunk; Chicago & West Michigan; Cleveland, Cincinnati, Chicago & St. Louis; Elgin, Joliet & Eastern; Grand Trunk; Louisville, New Albany & Chicago; Lake Shore & Michigan Southern; Michigan Central; New York, Chicago & St. Louis; Pennsylvania System; Pennsylvania Company.

Western: Atchison, Topeka & Santa Fé; Burlington, Cedar Rapids & Northern: Canadian Pacific; Chicago & Alton; Chicago, Milwaukee & St. Paul: Chicago & Northwestern; Chicago, St. Paul, Minneapolis & Omaha; Chicago, Burlington & Quincy; Chicago, Rock Island & Pacific; Chicago Great Western; Duluth & Iron Range; Great Northern; Illinois Central; Keokuk & Western: Missouri, Kansas & Texas; Minneapolis & St. Louis; Northern Pacific; Quincy, Omaha & Kansas City; St. Paul & Duluth; Sioux City & Pacific; Wabash; Wisconsin Central lines.

Chicago is the greatest grain center of the world. During the year 1896 the receipts of grain, and of flour in its grain equivalent, aggregated 253,802,134 bushels. The receipts of live stock during the year comprised 14,094,-918 head, aggregating \$187,745,655. The great Union Stock Yards constitute a noted feature of the city, comprising as they do 345 acres, and the cost of the structures being over \$3,-000,000.

On Oct. 8, 9, and 10, 1871, Chicago was visited with the greatest conflagration known in the annals of the world, 2,100 acres having been burned over, and property destroyed to the amount of \$190,000,000, but in less than a decade after this great calamity the metropolis had thoroughly recuperated from the loss.

A notable feature in the history of Chicago was the anarchist riot in 1886, during which a bomb thrown at a meeting of anarchists into a platoon of policemen killed or injured many of the latter. After an exciting trial in which the whole country took a deep interest, a number of the anarchists were condemned to death and subsequently executed.

The park system of Chicago, established by the state legislature in 1869, has scarcely a parallel in America, whether as regards extent of area or ornamentation of grounds. The length of the boulevards, some of them 200 ft. wide, amounts to nearly 60 mi., and new additions are constantly being made to their extent.

The manufactures of the city include nearly every variety of production; but those of, together with the trade in, lumber and iron, should be especially mentioned. The greatest industry of the city, however, is pork and beef packing, which surpasses that of any other city in the world. The number of persons employed in all manufacturing industries in the city in 1896 was 152,806.

A feature of Chicago destined to add vastly to its fame is the colossal Sanitary or Drainage Canal, extending from Chicago to Joliet and about finished to Lockport. This great work is intended to turn the waters of Lake Michigan south into the Kankakee and Illinois rivers, and the width is made 200 ft., with an average depth of over 20 ft., with the design of having it eventually used as a part of a ship canal to the Mississippi River. See Drainage Canal.

The city of Chicago covers an area of 187 sq. mi., and has 2,570 mi. of streets and alleys. The fire department is efficiently organized, with 86 steam engines, 4 fire-boats, 27 chemical engines, 42 hose wagons, 33 hook-and-ladder trucks, 53 chemical extinguishers, and 68 portable pumps.

Its river, with its three branches, is spanned by 33 bridges. It has 20 theaters, 25 orphan asylums, 7 hospitals, and 290 churches.

asylums, 7 hospitals, and 290 churches. There are in Chicago 38 daily publications of all kinds, 280 weekly publications, 56 semimonthly, 319 monthly, and 42 quarterly. 600,-000,000 copies of all descriptions of publications were issued in the city in 1896.

Perhaps no city in the Union is more generously provided with public libraries than Chicago. The Chicago Public Library has 220,000 volumes; the Newberry Library (endowed with \$2,141,201) 145,000 choice and rare volumes, mainly for reference; and the John Crerar Library recently opened (with an endowment fund of \$2,500,000) has now between 30,000 and 40,000 volumes, and the number will be rapidly increased. The city has several great educational and theological institutions, among which the most prominent is the University of Chicago endowed with \$7,000,000.

The population of Chicago, according to a school census taken in 1896, was 1,619,226, and the city council later in the year officially declared it to be 1,750,000.

The following are the mayors of Chicago since the first charter election in 1837: William B. Ogden, 1837-1838; Buckner S. Morris, 1838-39; Benjamin W. Raymond, 1839-40; Alexander Lloyd, 1840-41; Francis C. Sherman, 1841-42; Benjamin W. Raymond, 1842-43; Augustus Garrett, 1843-44; A. S. Sherman, 1844-45; Augustus Garrett, 1845-46; John P.

Chapin, 1846–47; James Curtiss, 1847–48; James H. Woodworth, 1848–50; James Curtiss, 1850– 51; Walter S. Gurnee, 1851–53; Charles M. Gray, 1853–54; Isaac L. Milliken, 1854–55: Levi D. Boone, 1855–56; Thomas Dyer, 1856– 57; John Wentworth, 1857–58; John C. Haynes, 1858–60; John Wentworth, 1860–61; Julian S. Rumsey; 1861–62; Francis C. Sherman, 1862– 65; John B. Rice, 1865–69; Roswell B. Mason, 1869–71; Joseph Medill, 1871–73; Harvey D. Colvin, 1873–76; Monroe Heath, 1876–79; Carter H. Harrison, 1879–87; John A. Roche, 1887–89; Dewitt C. Cregier, 1880–91; Hempstead Washburne, 1891–93; Carter H. Harrison (assassinated) 1893; George B. Swift, 1893; John P. Hopkins, 1893–94; George B. Swift, 1894–97: Carter H. Harrison, Jr., 1897.

**Chicago**, UNIVERSITY OF, was first founded in 1857 by the Baptist Society of Chicago. Its doors were closed in 1886 owing to lack of funds. The present university was founded by John D. Rockefeller who started the endowment fund with \$600,000. Later he added \$4,500,000 besides erecting two dormitories. William Rainey Harper was called in 1891 to the presidency of the new institution, and the first lectures were given in October, 1892. The year is divided into four quarters, each continuing twelve weeks, with a recess of one week between. The annual income is \$1,860,-000; students, 1,850; instructors, 187; buildings, 23; books, 350,000.

**Chickahom'iny**, a river in Virginia, rising about 20 mi. n.w. of Richmond, flowing s.e. till it joins the James River. Near this river many important battles during the Civil War took place--the battle of Williamsburg, of the Seven Pines, of Gaines's Mill, etc.

**Chickamau'ga**, a small tributary of the Tennessee River, where a battle took place Sept. 19-20, 1863, between the Federal troops under Rosecrans and the Confederates under Bragg and Longstreet, the latter gaining the victory.

**Chick asaw Indians**, a tribe of American Indians of the Appalachian nation. In 1833 they gave up to the U. S. the last of their lands south of the Tennessee River, receiving as compensation a money indemnity and new lands on the left bank of the Red River, in the Indian Territory. The Chickasaws number about 8,000. They have made considerable advances toward civilization, have a senate, house of representatives, and more than a million dollars in deposit with the Union government.

**Chickering,** JONAS (1797-1853), American manufacturer. He received a common school education and was apprenticed to a cabinet maker. In 1818 he went to Boston and took a position with a pianoforte maker. In 1823 he set up for himself, in a small way, as a manufacturer of pianos. This business became greatly extended, until he furnished annually about 2,000 instruments. In 1852 his factory was burned, and before the new one had been completed he died. He made many valuable improvements and for many years was the leading maker of pianos both in this country and Europe. **Chicla' na**, a town, Spain, Andalusia, 12 mi. s.e. Cadiz, built of snow-white stone, contains a magnificent hospital, and has manufactures of linen, earthenware, etc. The sulphur baths, temperature  $60^{\circ}$ , are efficacious in cutaneous affections, and are much frequented. Pop. 11,627.

**Chico,** Butte co., Cal., near Sacramento River, 100 mi. n. of Sacramento. Railroad, S. P. O. & C., running from San Francisco to Portland. Industries: lumber mill, flour mill, and iron foundry. Coal, oil, and gas in vicinity. Surrounding country agricultural and mineral. The town was first settled in 1850 and became a city in 1870. Pop. est. 1897, 5,000.

**Chicopee**, Hampden co., Mass., on left bank of Connecticut and mouth of Chicopee River, 95 mi. w.s.w. of Boston. Railroad, Connecticut River. The industries embrace cotton mills, manufacture of agricultural implements, knitting mills, bicycle and rifle factories, large bleachery, machinery, and bronze statuary, brass foundries, bobbin and reel factories. Pop. est. 1897, 12,000.

Chic'ory, a genus of composite plants. The leaves are sometimes blanched, to be used as salad. But the most important part of the plant is its long, fleshy, and milky root. which when roasted and ground is now extensively used for mixing \_ with coffee. Its presence among coffee may easily be detected by putting a spoonful of the mixture into a



Chicory. a.—single flower; b.—separate floret.

glass of clear cold water, when the coffee will float on the surface, and the chicory separate and discolor the water as it subsides.

**Chiem-See** ( $h\bar{e}m'z\bar{a}$ ), a lake in southeastern Bavaria, 48 mi. s.e. Munich; greatest length 10 mi., greatest breadth 9 mi. Its scenery is beautiful, and it contains three pretty islands.

**Chieti** (ki-ā'tē), a town, Southern Italy, capital of province of same name. It is well built, and has manufactures of woolens, etc. Pop. 12,273.

**Chigoe** (chig' $\check{e}$ ) (or Jigger), a very curious insect closely resembling the common flea, but of more minute size, found in the West Indies and South America, and in parts of the U.S. It burrows beneath the skin of the foot, and soon acquires the size of a pea, its abdomen becoming distended with eggs. If these eggs remain to be hatched beneath the skin great irritation and even troublesome sores are sure to result.



Chigoe. a.-male, b.-gravid female.

**Chih-le** (chi- $l\bar{e}'$ ) (or Pe-chi-le), one of the northern provinces of China, watered by the Pei-ho, containing Peking the imperial capital. Area about 59,000 sq. mi.; pop. 18,000,000.

Area about 59,000 sq. mi.; pop. 18,000,000. Chihuahua (chē-wä-wä), a city of Mexico, capital of the state of the same name, generally well built, and supplied with water by a notable aqueduct. It is surrounded by silver mines, and is an important entrepôt of trade. Pop. 12,000. The state is bounded on the n. by the U.S. and on the n.e. by the Rio Grande ded Norte; has a healthy climate, and is rich in silver mines. Pop. 225,941.

Child, LYDIA MARIA (1802-1880), American author; was educated in common schools. She taught for one year in a seminary in Medford, Mass., and kept a private school in Water-town from 1824 till 1828, when she was married to David Lee Child. She became early interested in the antislavery movement and published An Appeal to that Class of Americans Called Africans, which was the first antislavery work printed in America in book form. In 1841 she removed to New York where she was editor of the National Antislavery Standard until 1843. She contributed largely to aid the Union soldiers during the Civil War, and afterward helped the freedmen and gave lavishly for the support of schools for the negroes. Her antislavery writings contributed greatly to the formation of public sentiment.

**Childebert**, the name of three kings of the Merovingian dynasty, France (495-711). The last, Childebert III, was one of those Merovingian kings, who, from their incapacity, received the appellation of *rois fainéants* or *sluggard kings*.

**Childs**, GEORGE WILLIAM (1829-1884), American public man and philanthropist. He was long identified with the *Philadelphia Ledger* which he made most successful, was a heavy contributor to charities and erected many stained glass windows to celebrities. In 1890 he published his *Recollections*.

**Chile** (or Chili) (chē'lā, chē'lē), a country of South America, extending along the Pacific Coast from lat. 18° south nearly to Cape Horn, and including Chiloé and many other islands and part of Terra del Fuego. It is bounded on the n. by Peru, on the n. e. and e. by Bolivia and the Argentine Republic, from which it is separated by the chief range of the Cordilleras. Its length from north to south is about 2,400 mi.; its breadth, on an average, 120 mi.; area 293,310 sq. mi., divided into a number of provinces and territories; pop. (1890)

2,665,926. By the war with Peru and Bolivia which terminated in 1882 Chile gained all the seaboard of Bolivia, and annexed also the Pe-ruvian provinces of Tarapacá and Tacna (the latter for ten years, after which a plebiscite is to decide whether it shall go to Chile or Peru). The chief towns are Santiago, or St. Jago (the capital) and Valparaiso. The rivers are numerous, but small, and have generally rapid Currents; the principal are the Biobio, the Valdivia, Lontue, Maule, Itata, and Chuapa or Illapel. The surface is greatly diversified. Some of the summits rise to 20,000 ft. or more. but the elevation decreases toward the south. Chiloé and numerous other islands fringe the coast in the south. Earthquakes are common. those of 1822, 1835, and 1868 being particularly violent. In the Chilean Andes there are twenty volcanoes at least, three of which (Antuco, Villarica, and Osorno) are still active. The climate is remarkably salubrious. In the northern provinces it rarely rains—in some parts perhaps never; in the central parts rain is sufficiently abundant, while in the extreme south there is even an excess of moisture. Among the minerals of Chile are gold, silver, copper. lead, iron, zinc, antimony, manganese, arsenic. tin, sulphur, alum, salt, and cubic niter. Silver and copper are the two most important metals. The copper mines are most numerous in the northern districts. The cubic niter, or Chile saltpeter, is a great source of wealth Coal is wrought at several places. Though possessing many fertile tracts, a great portion of Chile is incapable of cultivation, being naked and mountainous. In some of the northern districts maize is cultivated; in the southern districts wheat and barley are the chief agricultural products. Fruits are abundant-apples, pears, apricots. peaches, figs, grapes, or anges, watermelons, etc. The spread of European plants has been so great in some places as to crowd out native species, and cultivation is rapidly carrying this farther. The wild animals include the guanaco, puma, or American lion, the chinchilla, coypu, deer, etc. Cattle are raised in great numbers, from 4,000 to 20.-000 being sometimes reared on one farm. The manufactures are of little importance, but include cordage, soap, copper wares, leather. brandy, etc. The commerce is increasing rapidly. Mineral products form five sixths of the total exports, the principal article being cubic niter (or Chile saltpeter). Next come copper. iodine, wheat, silver, etc. Accounts are in pesos or dollars, the silver peso having the value of 77 cents. There are about 1,600 mi. of railway. A line is in progress to cross the Andes into the Argentine Republic.

Chile is a republic, and is considered the best regulated in South America. It is under a president elected for five years and a council of state. The legislature is composed of asenate elected for six years, and a house of deputies elected for three years. The army numbers about 7,000 men; the chief vessels of the navy are three ironclads and one protected cruiser. The Chileans are mostly of Spanish or Indian descent. Schools and colleges have been es-

tablished. The Roman Catholic is the established religion of Chile, but the members of other denominations are allowed to erect edifices in which to worship. The part of Chile lying south of the River Biobio is inhabited chiefly by Indians. The Araucanians inhabit the region lying between the rivers Biobio and Valdivia, and long maintained their independence, till in 1882 they became subjects of the Chilean government.

Chile originally belonged to the Incas of Peru, from whom it was wrested by the Spaniards under Pizarro and Almagro in 1535. From this period Chile continued a colony of Spain till 1810, when a revolution commenced, which terminated in 1817 in the independence of Chile. A war begun with Spain in 1865 led to the blockade of the coast by the Spanish fleet, and the bombardment of Valparaiso in 1866. In 1879 a war broke out with Bolivia and Peru, in reference to the rights of Chile in the mineral district of Atacama. This war was virtually finished in 1881, and the victorious Chileans gained a large accession of territory from both Bolivia and Peru. In 1891 an insurrection, headed by influential members of congress, caused by dissatisfaction with President Balmaceda's administration, was successful, and resulted in his overthrow.

**Chilian** (chil-yán'), a town, Chile, capital of the province Nuble, in an angle between the Chillan and Nuble, connected by rail with Talcahuano and Santiago. Pop. about 20,000.

**Chilled Iron,** iron cast in metal molds called *chills*, where, on account of the rapid conducting of the heat, the iron cools more quickly on the surface than it would do if cast in sand. Chilled iron is whiter and has a harder surface than iron cast in any other way. **Chillicothe,** Livingston co., Mo., 75 mi. e. of

**Chillicothe,** Livingston co., Mo., 75 mi. e. of Kansas City. Railroads: Hannibal & St. Jo; C. M. & St. P.; and Wabash. Industries: railroad round houses, and machine shops, furniture factory, foundry, 3 flouring mills and 3 cigar factories. Surrounding country is agricultural. The town was first settled in 1835 and became a city in 1845. Pop. est. 1897, 10.000.

**Chillicothe**, Ross co., O., on right bank of Scioto River, 50 mi. s. of Columbus. Railroad, C. W. & B. Principal industries: flouring and paper mills, shoe and furniture factories, carriage, and wagon, and farm implement works. The town was founded in 1796 and is pleasantly situated in a valley surrounded by hills nearly 500 ft. high. Pop. est. 1897, 15,000.

**Chillon** (shē-yon), a castle, Switzerland, on the Lake of Geneva, 64 mi. s.e. of Vevay, once an important stronghold of the Counts of Savoy, and the prison house of Francis Bonnivard, prior of St. Victor, Geneva, from 1530 to 1536. It has acquired interest from Byron's poem, The Prisoner of Chillon. **Chiloé** (chēl-wā'), a province and island of

**Chiloé** (chēl-wā'), a province and island of Chile. The province comprehends the island of Chiloé, together with a number of other islands, and a portion of the mainland. The island of Chiloé is for the most part covered with dense forests, but large tracts of it are still unexplored. The chief town is San Carlos, or Ancud. The exports consist chiefly of timber from the forests of the island and the mainland. The climate is healthy but very wet. Area of the province, 30,981 sq. m; pop. 71,388.

**Chilon** (kī'lon) (or Chilo), one of the so-called seven wise men of Greece. He flourished about the beginning of the sixth century B.C., and was a native of Sparta, and one of the Ephori, or chief magistrates. A collection of his sayings is extant.

**Chimæra** (Chimera) (ki-mē'ra), in classical mythology, a fire-breathing monster, the foreparts of whose body were those of a lion, the middle of a goat, and the hinder of a dragon. Thus the name came to be used for an unnatural production of the fancy.

**Chimbora'zo**, a mountain of Ecuador, in the province of Quito, about 90 mi. s. by w. of Quito. Though not the loftiest summit of the Andes, it rises to the height of 20,703 ft. above the level of the sea, and is covered with perpetual snow 2.600 feet from the summit and upward. In 1880 it was ascended to the top for the first time by E. Whymper.

**Chimes**, a species of music, mechanically produced by the strokes of hammers against a series of bells, tuned agreeably to a given musical scale. The hammers are lifted by levers acted upon by metallic pins, or wooden pegs. stuck into a large barrel, which is made to revolve by clock-work, and is so connected with the striking part of the clock mechanism that it is set in motion by it at certain intervals of time, usually every hour, or every quarter of an hour. The chime mechanism is sometimes so constructed that it may be played like a piano, but with the fist instead of the fingers.

**Chim' ney,** an erection generally of stone or brick containing a passage by which the smoke of a fire or furnace escapes to the open air. In this sense the first chimneys we hear of are no earlier than the Middle Ages. The longer a chimney is the more perfect is its draught, provided the fire is great enough to heat the column of air in it, because the tendency of the smoke to draw upward is in proportion to the difference of weight between the heated air in a chimney and an equal column of external air.

**Chimpan'zee**, the native Guinea name of a large West and Central African ape belonging to the anthropoid or man-like monkeys, and to the same genus as the gorilla. When full grown it is sometimes about 5 ft. high, with black hair, and is not so large and powerful as the gorilla. Like the orang it has the hair on its forearm turned backward, but differs from it in having an additional dorsal vertebra and a thirteenth pair of ribs. It walks erect better than most of the apes. It feeds on fruits, often robs the gardens of the natives, and constructs a sort of nest among the branches. It is common in menageries, where it shows much intelligence and docility.

**China,** an immense empire stretching from the center of Asia for 3,000 mi. to the east

### China

coast of Korea, and from the Siberian frontjer at the river Amoor for 2,400 mi. southward to the island of Hainan. The vast empire, second in magnitude only to that of Russia and Great Britain, has an area of about 4,500,000 sq. mi., and a population variously estimated at 300,000,-000, 400,000,000, or more, and is usually divided into China Proper and the dependencies Manchuria, Mongolia, Eastern Turkestan, Dzoungaria, and Thibet, of which Thibet is practically autonomous, although controlled in its foreign relations by the Chinese government. Korea acknowledges the suzerainty of China, but hardly forms part of the empire. The dependencies, though they cover more than 3,000,000 sq. mi., contain but a small and relatively unimportant part of the population (about 30,000,000), China Proper being the center of power and population.

CHINA PROPER, known to Marco Polo and earlier travelers by the Tartar name of *Cathay*, called "Middle Kingdom" by the Chinese,



Chimpanzee.

comprises the following provinces: Chihle, Shantung, Shansi, Honan, Kiangsu, Nganhwuy, Kiangsi, Chekiang, Fukien, Hupeh, Hunan, Shensi, Kansu, Szechuen, Kwantung, Kwangsi, Yunnan, Queichow. The total extent is about 1.554,000 sq. mi. Peking is the capital. There are many large and populous cities.

Physical Features.—Great part of the country is not well known. The coast line forms an irregular curve of about 2,500 miles. It is not deeply penetrated by gulfs, the only one of great extent being that of Pe-che-le in the northeast, but numerous indentations of sufficient dimensions to form safe and capacious roadsteads are found in every quarter. It is characterized by a fringe of islands and islets, the largest of which are Formosa and Hainan. The Gulf of Pe-che-le, the Yellow Sea, and the China Sea wash the eastern and southeastern shores, and are characterized by destructive

# China

The inland boundaries are formed storms. mainly by Tonquin, Burmah, Thibet, and, on the north, partly by the Great Wall separating China from Mongolia, one of the most remarkable of human structures, being an artificial barrier 1,500 mi. long. Two thirds of the interior are estimated to be mountainous. The general slope is from west to east, and the mountains are a continuation of those of Thibet and Central Asia. The great Kuen-lun range throws off branches, the Tsing-Ling, Fu-niushan, and Mu-ling, which, running eastward between the great valleys of the Hoang-Ho and Yang-tse-kiang, traverse almost the whole breadth of China. Farther north the Nan-shan branch of the Kuen-lun range runs under various names (Kuliang, Alashan, Inshan, etc.) along the northeast of China till it reaches the frontier of Manchuria, north of Peking. The third great mountain system of China is in as the Nanshan, the Ta-yu-ling, and Pu-ling stretch on the south side of the Yang-tsekiang all the way from the highlands of Yun-nan to the eastern seaboard. Between these mountain systems, and following courses which may be roughly described as parallel, run the two great rivers of China, the Hoang-Ho and the Yang-tse-kiang. Here lie the central aud richest provinces of China. On both sides of the lower Hoang-Ho is an immense delta plain. consisting generally of a deep alluvial soil of unparalleled fertility. As they approach the seacoast the two rivers are connected by the Grand Canal, 700 miles in length, thus completing a magnificent system of inland naviga-tion. The Hoang-Ho has changed its lower course several times, and is subject to tremen-dous and disastrous floods. Besides these rivers and their numerous tributaries, the most deserving of notice are the Se-kiang in the south. of considerable size, but still more commercial importance, having at or near its embou-chere Canton, Hong-Kong, and Maceo; and the Pei-ho, which, though much smaller, forms a waterway between Peking and the gulf of Pe-che-le. There are a number of lakes, Pe-che-le. mostly of no great size: the largest is Tung-ting, near the center of China. A remarkable feature of the surface of Northern China is the deposit of *loess*, a brownish yellow earth of great fertility, which covers an immense area both of mountain and valley, and enables agriculture to be successfully carried to the height 7,000 or 8,000 ft.

Climate.—The greater part of China belongs to the temperate zone, but it has what is called an excessive climate. At Peking in summer the heat ranges from 90° to 100° in the shade, while the winter is so cold that the rivers are usually frozen from December to March. At Shanghai the maximum temperature reaches  $100^\circ$ , and the minimum falls at least to  $20^\circ$  below freezing point ( $12^\circ$  F.). In the south the climate is of a tropical character, the summer heat rising to  $120^\circ$ . Here the southwest and northeast mouscons blow with great regularity, and divide the year between them. Among the greatest scourges of the country are the dread-

ful gales known as typhoons, from the Chinese Ta-fung, or "great wind." They never fail to commit great devastation, though happily they always give such timely notice of their approach that preparations can be made. The Hoang-Ho and Yang-tse-kiang basins have a pretty equable temperature, due to the soft moist winds of the Pacific.

Productions.-China is well supplied with minerals, including gold, silver, copper, iron, and other metals, and there are very extensive coal fields, though the quantity raised from them is comparatively small. Salt is abundant. and there are inexhaustible beds of kaolin, or porcelain earth. Among animals it is difficult to mention any that are characteristic of the country; many of them are identical with or differ but little from those of Europe. In the south and southwest the tiger, the rhinoceros, and elephant are found; bears are common in many parts; other carnivora are the wild cat, badger, lynx, marten, etc. Camels and elephants are used in a domestic state, but the chief domesticated animal is the buffalo. The horses are of a poor breed. Among birds the most beautiful are the gold and silver pheas-Fish swarm in all inland waters as well ants. as on the coast, the natural supply being immensely increased by artificial means. As regards the flora of China, it is tropical in the south (coco and sago palms, banana, pandanus, etc.), sub-tropical farther north, and still farther north prevails a number of plants and trees identical with or closely akin to those of middle Europe. Flowering plants, shrubs, and trees are so exceedingly abundant as to form a feature. The bamboo, from the immense number of uses to which it is put, is one of the most valuable of trees. Oaks, the chestnut, hazel, pines, yew, walnut, etc., are among for-est trees. Wax and camphor trees abound. Azaleas are exceedingly numerous; other flowering plants are the camellia rose, passion flower, cactus, lagerstroemia, etc. Fruits are abundant and varied. The soil, especially of the country comprising the two great river basins, is extremely fertile, and agriculture has always been held in high veneration in China. Rice, as the principal food of the people, is the staple crop. The rich alluvial plains which cover a great part of the surface are admirably adapted for its culture, and by careful man-agement yield amazing crops. In the north there is a variety called dry-soil rice, which is cultivated like any other cereal. Wheat, barley, and millet are the other chief grain crops. Other crops are maize, buckwheat, a great variety of beans, peas, and pulse generally, sugar cane, tobacco, and vegetables in endless variety, including potatoes, turnips, etc., and at the ports the best European and American vegetables. Varieties of the cabbage tribe are extensively cultivated for the oil extracted from the seeds. Three plants of the greatest economical importance to China are the mulberry, cultivated to provide food for silkworms, cotton, and tea, the last for long regarded as exclusively a Chinese product. Another important crop is the opium poppy, which is ex-

tensively grown, though the product is inferior to that of India.

Manufactures. - In arts and industry the Chinese have made considerable progress. One peculiar feature in their processes is the general absence of machinery, and the preponderance of manual labor. Among the chief industries is the silk manufacture, which produces some varieties of stuffs unsurpassed anywhere. Everybody wears silks: it is the prescribed attire of high officers. The finer kinds of it form the ordinary dresses of the opulent, while the poorest manage to deck themselves in coarser, if not on common, at least on gala days. The embroidery of silk is carried on to an amazing extent. Cotton goods are also largely made, though great quantities of European and American manufactures are also imported. Flax is not grown, but a good substitute for it is found in the fibers of two or three plants, from which the beautiful grass cloth, similar in appearance to linen, is extensively woven. Woolens are made only to a limited extent. The porcelain of China has been famous from the earliest periods, and the manufacture of the finest forms of it was long known to the Chinese alone, though their productions are now surpassed by those of Europe. In lacquered ware the Chinese continue unsurpassed. In working in metals they have only attained to mediocrity. The metallic products most deserving of notice are gongs, mirrors, statuettes in copper and bronze, and various kinds of carved, chased, and filigree work, both in gold and silver. In a great number of minor articles the workmanship is exquisite—fans, card cases, seals, combs, chess men of wood, ivory, mother-of-pearl, tortoise shell, etc. Paper is made of a great variety of substances, and the art of making it-like various others-was practised in China long before Europe acquired it.

Commerce.-The inland trade of China, aided by its vast system of water communication, is of incalculable magnitude, the rivers and canals literally swarming with junks, barges, and boats of all sizes. Roads, however, are few and bad, and railways have as yet only madea mere commencement. Telegraphs have made more progress, though the lines as yet do not much exceed 3,000 mi. A defective postal system is kept up, partly by the government, partly by private enterprise. By the opening of the principal ports (the "treaty" ports, twenty-two in number) the foreign commerce has been immensely increased. The chief of these ports are, Shanghai (by far the first), Canton, Hankow, Swatow, Tientsin, Ning-po, and Foo-chow. The main articles of export are tea and raw and manufactured silk; the main imports, cotton goods, opium, metals, and metal goods. The total exports and imports usually amount to more than \$200,000,000. Among the countries trading with China the principal are the U.S., Great Britain, India, and Russia. The quantity of opium imported, almost wholly from India, reaches the value of \$25,000,000 or \$30,000,000 annually. There are no national gold and silver coins. The usual

# China

unit or denomination of money is the *tael*, the value of which varies according to the rate of exchange. Silver and gold bullion, usually stamped with the name of the banker and the year and district in which it is cast, are used in larger transactions. Private bankers are found in all large towns. They issue paper money, which passes current in the particular districts where they are known. The Mexican dollar, of the value of \$1, is current in Canton and the south of China.

People.—The Chinese belong to the Mongolian race, but in them its harsher features, as represented in the genuine Tartars, are considerably softened. They are generally of low stature, have small hands and feet (the last artificially made so small in the females as to become a deformity), a dark complexion, a wide forehead, black hair, eyes and eyebrows obliquely turned upward at the outer extremities. In bodily strength they are far inferior to Europeans, but superior to most Asiatics, and their great assiduity and patient endurance of fatigue make them valuable as laborers. They are considered to be deficient in courage. In their moral qualities there is much that is amiable. They are strongly attached to their homes, hold age in respect, toil hard for the support of their families, and in the interior, where the worst kind of foreign intercourse has not debased them, exhibit un-



Foot of Chinese Girl (aged 16 years), in three positions: Copied from a cast in Trinity College, Dublin. (Length of foot, 4% inches.)

sophisticated simplicity of manners which recalls the age of the patriarchs. In the great mass these qualities are counterbalanced, or rather supplanted, by numerous vices-treachery, lying, and various others. The Chinese use great politeness in their intercourse with each other: but there is perhaps a want of frankness and sincerity. They scrupulously avoid all contradiction and offensive expressions in conversation. Gambling is a universal vice. Drunkenness has hitherto been rare among them, but the habit of opium-smoking has much extended of late. But, with many vicious characteristics, the Chinese are preserved from degeneration by their universal frugality and thrift. Hard work, done in the most uncomplaining way, has become second nature with them. Filial piety is also a striking feature of their character, and is, in fact, the principle upon which Chinese society is constituted. They have chambers set apart for the worship of their ancestors, where religious ceremonies are regularly performed.

Language, Religion, Etc.-The Chinese is the most important and most widely spread of the so-called monosyllabic languages of Eastern Asia, in which each word is uttered by a single movement of the organs of speech. There is no alphabet, each word being represented by a single symbol or character. These written characters appear to have been originally hieroglyphics or rude copies of the objects designed to be expressed by them; but the hieroglyphic features have almost entirely disappeared, and many of the symbols are formed of what seems to be an arbitrary combination of lines, or are built up of other symbols combined. In writing or printing the characters are arranged in vertical columns, to be read from top to bottom. The art of making paper is said to have been known in the first century after Christ, and printing from wooden blocks in the seventh or eighth century, hundreds of years before these valuable arts were reinvented in Europe; and the Chinese literature is now very extensive. There are great numbers of treatises on almost all subjects - science, history, geography, belles-lettres, and poetry; literary eminence is the sure avenue to the highest honors and offices of the state, and hence "the literati are the gentry, the magistrates, the governors, the negotiators, the ministers of China." Among the more comfortable classes education of the kind which promises to be best rewarded is almost universal, and in every village there are schools for the lower classes, but attendance is not so general as was at one time supposed. The chief religions in China are Confucianism, Taouism, and Buddhism, the last introduced subsequently to the others. The religion of the learned and of the state, if it may be so called, is that founded by Kong-Fu-Tse or Confucius, about 550 B. C. Taouism, founded by Laotsze, is a compound of mystical and superstitious elements. But among the great mass of the people a form of Buddhism prevails, or a sort of mixture of the other three religions. In the western parts Mohammedanism has many followers. The most important Christian missions are those of the French Roman Catholics. who have been longest in the country and have numerous stations. Various Protestant bodies also carry on missionary operations in China, but hitherto with indifferent success, the Protestant converts only numbering from 25,000 to 30,000.

Gorernment, Administration, etc.—The government is an absolute despotism. The reigning dynasty is of Manchu Tartar blood. The emperor unites in his person the attributes of supreme magistrate and sovereign pontiff, and as the "Son of Heaven" is in theory accountable only to heaven. Four principal ministers, two of whom are Manchus and two Chinese. form, along with two assistants, the inner council of state. The government business is distributed among seven boards, having cognizance respectively of all civil officers, of revenue, of rites and ceremonies, of military affairs. desides these, there is the board of general supervision, or censorate composed of forty or

## China

fifty mandarins, who go out into the empire as imperial inspectors, and are privileged to make any remonstrance to the emperor without en-dangering their lives. The provinces, either single or by twos, are under a governor and sub-governor, and each province has also a chief criminal judge and a treasurer. Particular magistrates preside over particular districts and cities, and instead of being permanent are changed about once in three years. Although very excellent in theory, the public administration is very deficient in integrity and efficiency. There is no check on the authorities, and the lower mandarins devote their attention to raising money to make up for their insufficient salaries or to purchase higher offices. The Chinese military force consists of the Manchurian army, 270,000 strong, and an army composed of Chinese and other races numbering about 800,000. Under English officers their training and discipline have much improved of late, and the newest kinds of rifles and cannons have been imported from Europe. The navy consists of two fleets-one for rivers and another for sea;. but though it numbers many vessels, it is not very efficient, and is scarcely able to clear the Chinese coast from the pirates who infest the numerous creeks and islets. It has lately, however, been much strengthened by a number of steel corvettes built in England and Germany. The revenue of the empire is derived from customs, excise, taxes on land and property, and is said to amount to \$250,000,000, of which one half is paid in kind. The external debt is only about \$25,000,000.

History .- The early history of the Chinese is shrouded in fable, but it is certain that civilization had advanced much among them when it was only beginning to dawn on the nations of Europe. The Chow dynasty, which was founded by Woo-wang, and lasted from about 1100 B.C. to 258 B.C., is perhaps the earliest that can be regarded as historic, and even of it not much more is historic than the name. Under Ling-wang, one of the sovereigns of this dynasty, Confucius is said to have been born, some time in the sixth century B.C. During the latter half of the period during which this line of sovereigns held sway there appear to have been a number of rival kings in China, who lived in strife with one another. Chow-siang, who was the founder of the Tsin dynasty, from which China takes its name, gained the superiority over his rivals, and d. in 251 B.c. His great-grandson, a national hero of the Chinese, was the first to assume the title of "Hoang" (emperor), and called himself Che-Hoang-ti. He ruled over an empire nearly conterminous with modern China proper. In his reign, the great wall, designed as a protection against marauding Tartars, was begun in 214 B.C. Buddhism was intro-duced in 65 A.D. Subsequently the empire broke up into three or more states, and a long period of confusion and weak government ensued. In 960 a strong ruler managed to consolidate the empire, but the attacks of the Tartars were now causing much trouble. In

the thirteenth century the Mongols under Jenghis Khan and his son Ogdai conquered China, and in 1259 the celebrated Kublai Khan, a nephew of the latter, ascended the throne and founded the Mongol dynasty. His ninth descendant was driven from the throne, and a native dynasty called\_Ming again succeeded in 1368 in the person of Hungwu. A long period of peace ensued, but was broken about 1618, when the Manchus gained the ascendency, and after a war of twenty-seven years founded the existing Tartar dynasty in the person of Tungchi, establishing their capital in the northern city of Peking, which was nearer their native country and resources than the old capital Nan-king. The earliest authentic accounts of China published in Europe are those of Marco Polo, who visited the country in the thirteenth century. The first British intercourse was attempted under Queen Elizabeth in 1596, and a trade was subsequently established by the East India Company, but no direct intercourse between the governments took place till the embassy of Lord Macartney in 1792. A second embassy in 1816, by Lord Amherst. was treated with insolence; and subsequently the treatment of the British merchants became such that a collision was inevitable. In 1840 the British, on being refused redress for injuries, partly real and partly alleged, proceeded to hostilities, and after scattering, almost without a struggle, every force which was opposed to them, were preparing to lay siege to Nanking, when the Chinese found it necessary to sue for peace. A treaty was then concluded (1842), by which the five ports of Canton, Amoy, Foochow-foo, Ningpo, and Shanghai were opened to British merchants, the island of Hong-Kong ceded to the British in perpetuity, and the payment of \$21,000,000 agreed to be made by the Chinese. In 1850 an insurrection, headed by Hung-seu-tseuan or Tien-te, broke out in the provinces adjoining Canton, with the object of expelling the Manchu dynasty from the throne, as well as of restoring the ancient national religion of Shan-ti, and of making Tiente the founder of a new dynasty, which he called that of Tai-ping, or Universal Peace. After a long period of civil war the Tai-Ping rebellion was at length suppressed in 1865, chiefly by the exertions of General Gordon and other American and British officers at the head of the Chinese army. In October, 1856, the crew of a vessel belonging to Hong-Kong were seized by the Chinese. The men were afterward brought back, but all reparation or apology was refused. In consequence of this a war with China commenced, in which the French took part with the British. Peking had to be taken (1860) before the Chinese government finally gave way, and granted a treaty securing important privileges to the allies. A revolt of the Mohammedans in Turkestan had meantime taken place, but in 1874 it was at last suppressed, and in 1881 Russia restored the province of Kulja, thus completing the establishment of Chinese authority in Eastern Turkestan. The present emperor, Tsaitien, succeeded in 1875, but only assumed the reins
of government in 1887, on reaching the age of sixteen. The following succinct statement of recent progress in China was made in 1887 by Dr. Williamson, who has labored as a missionary in the country since 1863: "Who among us, ten years ago, would have dared to imagine that to-day China would have 1, a national fleet; 2, the telegraph radiating to the most distant provinces; 3, government colleges for engineering. navigation, military tactics, elec-tricity, and medicine, each college manned both by foreigners and educated natives: 4, the Kai-ping mines supplying steamers and north ports with excellent and cheap coal: 5, envoys to the leading countries, and consuls at Nagasaki, etc.; 6, Korea open; 7, the China Merchants' Steam Navigation fleet of over forty large vessels: 8, the Kai-ping railway, worked for nearly four years so successfully that an edict has been issued for its extension; 9, a national post office begun; 10, scientific questions added to those presented at several of the last triennial provincial examinations."

China, GREAT WALL OF, the largest artificial structure on the face of the earth, a barrier extending for about 1,500 mi. in the north of China proper, of which it partly forms the boundary. Its western end is in the deserts of Central Asia, its eastern reaches the sea to the northeast of Peking. It was erected as a barrier against the inroads of the barbarous tribes, and dates from about 214 B. c. It is carried over height and hollow, and avoids no inequality of the ground, reaching in one place the height of over 5,000 ft. above the sea. Earth, gravel, brick, and stone were used in its construction, and in some places it is much more substantial than in others. Its greatest height, including the parapet on its top, is about 50 ft., and it is strengthened by towers at regular distances.

China Grass, a plant of the nettle family, a native of Southern and Eastern Asia and the Asiatic islands, and now more or less cultivated in many other countries, such as South-ern France, Algeria, Natal, Mauritius, Australia, the U. S., Mexico, Jamaica, etc. It yields a fiber which possesses most valuable properties, and has long been made in China into a beautiful cloth, and is probably destined to play a much more important part as a textile material. It is very strong, presents unusual resistance to the effects of moisture, and is fine and silky in appearance. With wool, hemp, cotton, and flax it is believed that it may successfully compete, but its full capabilities are hardly as yet known, though it is long since trials have been made with it as a subject of manufacture. Recently considerable quantities have been used in France, and woven both pure and mixed into various beautiful fabrics. In England such articles as ladies' scarfs, handerchiefs, umbrella-covers, etc., are made of it. Hitherto, however, its high price, owing to the difficulty of preparing it in a suitable form for manufacture, has been against its use, but a sufficiently cheap process of preparation is said to have been recently invented. Called also Rhea. Rheea, Ramie, or Ramee,

China Ink, a black solid, which, when rubbed down with water, forms a very pure black indelible ink. It has been used in China from There are different actime immemorial. counts of the process, but it appears to be made by boiling the juices of certain plants with water to a syrup, adding to this a quantity of gelatin, and then thoroughly incorporating the carbonaceous matter. There is generally added some perfume - a little musk or camphor. The mass is then made into square columns of different sizes, which are often decorated with figures and Chinese char-Many attempts have been made to acters. imitate Chinese ink, some of which have been tolerably successful. Good Chinese ink should have a velvety-black appearance, with a gloss which becomes very conspicuous on rubbing. The color it gives on paper should be pure, black, and homogeneous, and if water be passed over it, it should not run or become streaky. It is indelible by ordinary solvents, but may be removed sometimes mechanically.

**Chinandega** (chē-nan-dā'ga), a town of Central America, Nicaragua, 20 mi. n.w. of Leon, connected by railway with the port of Corinto, and carrying on a considerable trade. Pop. 8,000.

China Rose, the name given to a number of varieties of garden rose chiefly derived from two natives of China. Also a name sometimes given to one of the mallow tribe, common in China and the East Indies, and an ornament in hothouses.

China Sea, that part of the North Pacific Ocean bounded n. by Formosa. n.w. by China, w. by Anam and the Malay Peninsula. s.e. by Borneo, and e. by the Philippines. It contains numerous islands, receives several considerable rivers, and forms the important Gulfs of Siam and Tonquin.

China Ware, porcelain, the finest and most beautiful of all the kinds of earthenware, so called from China being the country which first supplied it to Europeans. The Chinese are said to have manufactured porcelain previous to the Christian era, but it was not till five or six centuries later that they attained any great perfection in the art. Japan also appears to have been early acquainted with the manufacture. In the beginning of the sixteenth century the ware was first introduced into Europe, and won immediate popularity by its beauty and novelty. For long it was thought impossible to fabricate anything similar in Europe, but at length John Frederick Böttcher or Böttiger, a native of Saxony who had long devoted himself to alchemy, discovered a means of producing a porcelain equal in whiteness to that of China. This led to the establishment by the government of the farfamed porcelain manufactory at Meissen, near Dresden. The Saxon porcelain soon became celebrated over Europe, and rivaled that of China in the excellence of its quality and the beauty of its decorations. Subsequently porcelain works were established at Vienna, Munich, and elsewhere in Germany. In France also about the middle of the eighteenth cen-

tury the celebrated factory at Sèvres was set up and soon acquired a great renown. The first successful attempt in England to manufacture porcelain was made by some Germans, who established a factory at Chelsea, from which, in 1748, it was transferred to Derby. About twenty years afterward the valuable discovery in Cornwall of an excellent species of clay contributed greatly to improve the quality of English porcelain, which now began to be largely manufactured in Staffordshire under the auspices of the celebrated Josiah Wedgwood. China ware, when broken, presents a granular surface, with a texture compact, dense, firm, hard, vitreous, and durable. It is semi-transparent, with a covering of white glass, clear, smooth, unaffected by all acids excepting the hydrofluoric, and resisting uninjured sudden changes of temperature. For the process of manufacture, see Pottery.

**China Wax**, a sort of wax deposited by insects on a deciduous tree with light green, ovate, serrated leaves, cultivated in the province of Si-chuen (Ssu-chuan) in Southwestern China. The insects, a species of Coccus are bred in galls which are formed on a different tree, an evergreen, and these galls are transported in great quantities to the districts where the wax trees are grown, to the branches of which they are suspended. Having emerged from the galls the insects spread themselves over the branches, which gradually become coated with a white waxy substance, reaching in 90 or 100 days the thickness of a quarter of an inch. The branches are then lopped off and the wax removed. It is white in color and is chiefly made into candles; it melts at 160° whereas tallow melts at about 95°.

Chincha Islands (chin'chà), a group of small islands off the coast of Peru. Immense deposits of guano used to exist here, but are now exhausted. Guano from these islands began to be imported into Europe on an experimental scale about 1832, and the trade rapidly grew into importance. The Peruvian government retained the monopoly of the export, and made it one of the chief sources of its revenues.

Chinchil' la, a genus of South American her-



Chinchilla.

bivorous rodents very closely allied to the rabbit, which they resemble in the general shape of the body, in the limbs being longer behind than before, in the conformation of the rootless molars, and by the nature of the fur, which is more woolly and silky; but differing from the rabbit in the number of their incisors and molars, in a greater length of tail, and also in having broader and more rounded ears. C. Lanigera, a species about 15 in. long, is covered with a beautiful pearly-gray fur, which is highly esteemed as stuff for muffs, pelisses, linings, etc. The chinchilla lives gregariously in the mountains of most parts of South America, and makes numerous and very deep burrows. It is of a gentle nature and very sportive.

Chinese Exclusion Act (or Geary Law).-The act of May 5, 1892, contains all laws now in force prohibiting and regulating the coming into the U.S. of Chinese persons and persons of Chinese descent, such act to remain in force for ten years from its passage. Any Chinese adjudged to be not lawfully entitled to remain in the U.S. shall be removed to China, unless he shall make it appear that he is a subject or citizen of some other country, in which case he shall be removed to such other country. All Chinese laborers within the U.S. must apply to the collector of internal revenue of their respective districts, within one year, for a certificate of residence; and any Chinese neglecting to do this shall be adjudged to be here unlawfully, and may be arrested and taken before a U. S. judge, who shall order that he be deported from the U. S., unless he shall prove that by sickness or unavoidable cause he has been unable to procure his certificate, and by at least one credible white person that he was a resident of the U.S. at the time of the passage of this act; and if upon the hearing it shall appear that he is so entitled to a certificate, it shall be granted upon his paying the cost. Any Chinaman other than a laborer, having a right to remain in the U.S., desiring such certificate, may apply for and receive the same. The constitutionality of this act was affirmed by the U. S. Supreme Court, May 15, 1893.

Ching leput (ching gl-put) (or Chengalpat), a coast district, and its capital, Hindustan, presidency Madras. The district, which lies s. of Arcot and Madras—area about 2,842 sq. mi—has generally a bad soil, broken up frequently by granite rocks. Pop. 981,381. This tract of country was in 1750 and in 1763 obtained by the East India Company from the Nabob of Arcot. The town is 15 mi. w. from the Bay of Bengal, and 35 mi. s.s.w. Madras, and has a pop. of 5.617.

chink 'apin, the American dwarf chestnut. Chink 'apin, the American dwarf chestnut. Chin-Kiang (or Tchang - Kiang), a city, China, province of Kiangsu, right bank of the Yang-tse-Kiang, near the junction of the Imperial Canal; one of the treaty ports, advantageously situated for trade, which it carries on to the value of several millions sterling a year. In 1842 it was taken by the British, after a determined resistance on the part of the Manchu garrison. It suffered severely in the Tai-Ping rebellion. Pop. 135,000.

# Chinsurah

**Chinsu rah**, a town in Hindustan, 20 mi. n. of Calcutta, beautifully situated on the Hoogli, closely adjoining the town of Hoogli, and now included in its municipality. It is a military station, was formerly a Dutch settlement, and contains many neat houses in the Dutch style. Pop. 34,761.

Pop. 34,761. Chioggia (ki-od'jå), a seaport town of Italy, on one of the lagoon islands of the Adriatic, 15 mi. from Venice. It is built partly on piles, and has some handsome edifices. Its harbor is fortified, and it has shipbuilding yards, fisheries, and a coasting trade. Pop. 20,381.

**Chip' munk,** the popular name in America of the ground squirrel, genus *Tamias*,

**Chippeways** (chip'e-wāz) (or Ojibbeways), a tribe of North American Indians, U. S. and Canada. They are distributed in bands round both sides of the basin of Lake Superior, where they once owned vast tracts. They are of the



Chipmunk.

Algonquin stock, tall, active, and well formed, subsist chiefly by hunting and fishing, and number about 18,000.

**Chiquimula** (chi-ki-mö'lå), a department of the Central American state of Guatemala. Area 4,000 sq. mi.; pop. 53,000.

**Chiquitos** (chi-k $\bar{s}$ 't $\bar{o}s$ ), an Indian people of Bolivia, about the head waters of the Madeira and Paraguay. They number about 22,000, distributed among ten missions which still survive as a monument of Jesuit perseverance.

**Chiriqui** (chi-ri- $k\bar{e}'$ ), a district in the state or department of Panama, Colombia. It is naturally very fertile, and has good harbors both on the Caribbean and Pacific coasts. The name is also given to a lagoon and an archipelago on the coast of this state.

**Chiron** (kī-ron), the most famous of the Centaurs, a race fabled as half men, half horses. He lived at the foot of Mt. Pelion in Thessaly, and was celebrated through all Greece for his wisdom and acquirements, particularly for his skill in medicine and music; and the greatest princes and heroes of the time — Bacchus, Jason, Hercules, Achilles, etc., — were represented as his pupils.

**Chitaldrúg** (chit-al-drög'), a district and town of India, Mysore native state. The district, which is arid and stony, has an area of 4,571 sq. mi.; pop. 376,310. The town has fortifications constructed by Haider Ali, and was a station for British troops. Pop. 4,271.

# Chivairy

**Chitons** (kī' tonz) (Chitonidæ), a family of gasteropods, affording the only instance known of a molluscan shell formed of many successive portions, often in contact and overlapping each other, but never truly articulated. The



Chiton.

shell in the typical genus *Chiton* is composed of eight pieces, the animal adhering to rocks or stones after the fashion of the limpet. The species are numerous, and there are few rocky shores without some of them.

**Chittagong** (chit-), a district. Hindustan, in the southeast of Bengal, having the Bay of Bengal on the west; area 2,567 sq. mi.: pop. 1,132,-341. The level lands, chiefly on the coast and the valleys are very fertile. A considerable majority of the inhabitants are Mohammedans. Chittagong is also the name of a commissionership or division of Bengal. Area 12,118 sq. mi.: pop. 3,574,048. The city of Chittagong, chief town of the district and second port in Bengal, is situated on the Karnaphuli about 12 mi. from its mouth. Though very unhealthy, its trade has of late been steadily increasing. Pop. 20,969. **Chittagong Wood**, the wood of several

**Chittagong Wood**, the wood of several Indian trees, especially of *Chickrawsia tabulāris*, order Cedrelaceæ, a light-colored, beautifully grained wood used by cabinet makers.

Chivairy (chiv'al-ri), a term which indicates strictly the organization of knighthood as it existed in the Middle Ages, and in a general sense the spirit and aims which distinguished the knights of those times. The chief characteristics of the chivalric ages were a war-like spirit. a lofty devotion to the female sex, a love of adventure, and an undefinable thirst for glory. The Crusades gave for a time a religious turn to the spirit of chivalry, and various religious orders of knighthood arose, such as the Knights of St. John, the Templars, the Teu-tonic Knights, etc. The education of a knight in the days of chivalry was as follows: In his twelfth year he was sent to the court of some baron or noble knight, where he spent his time chiefly in attending on the ladies, and acquiring skill in the use of arms, in riding, etc. When advancing age and experience in the use of arms had qualified the page for war, he became an esquire or squire. This word is from L. scutum, a shield, it being among other

offices the squire's business to carry the shield of the knight whom he served. The third and highest rank of chivalry was that of knighthood, which was not conferred before the twenty-first year, except in the case of distin-guished birth or great achievements. The individual prepared himself by confessing, fasting, etc.; religious rites were performed, and then, after promising to be faithful, to protect ladies and orphans, never to lie nor utter slander, to live in harmony with his equals, etc., he received the accolade, a slight blow on the neck with the flat of the sword from the person who dubbed him a knight. This was often done on the eve of battle, to stimulate the new knight to deeds of valor; or after the combat, to reward signal bravery. Though chivalry had its defects, chief among which, perhaps, we may note a tendency to certain affectations and exaggerations of sentiment and profession, yet it is to be regarded as tempering in a very beneficial manner the natural rudeness of feudal society. As a system of education for the nobles it taught them the best ideals, social and moral, which the times could understand, and filled a place in civilization which as yet the arts and letters could hardly occupy

Chiadni (Mad'nē), ERNST FLORENT FRIED-RICH (1756-1827), German physicist. He investigated the laws of sound and made important experiments on the vibration of metallic and glass plates of various forms. His works include Discoveries Concerning the Theory of Sound (1787); Acoustics (1802); Contributions to Practical Acoustics, with Remarks on the Making of Instruments (1822); etc.

Chio'ral, a liquid first prepared by Liebig by passing dry chlorine gas through absolute alcohol to saturation, afterward by Städeler by the action of hydrochloric acid and man-ganese on starch. The hydrate of chloral, as now prepared is a white crystalline substance, which, in contact with alkalies, separates into chloroform and formic acid. Chloral kills by paralyzing the action of the heart. It is a hypnotic as well as an anæsthetic, and is frequently substituted for morphia. It has been successfully used in delirium tremens, St. Vitus's dance, poisoning by strychnia, in tetanus, and in some cases of asthma and whooping cough. It should be taken with great caution and under medical advice, as an extra dose may produce serious symptoms and even death. The treatment of poisoning by chloral is to keep the person warm by means of blankets, warm bottles, etc. Warm stimulating drinks should also be administered, such as hot coffee, hot tea, negus, etc. It has been shown that an animal kept warm by wrapping in cotton wool recovered from a dose of chloral that otherwise would have killed it.

**Chlo'rate**, a salt of chloric acid. The chlorates are very analogous to the nitrates. They are decomposed by a red heat, nearly all of them being converted into metallic chlorides, with evolution of pure oxygen. They deflagrate with inflammable substances with such facility that an explosion is produced by slight causes. The chlorates of sodium and potassium are used in medicine. The latter, in doses of from five to twenty grains, is largely used in scarlet fever, inflamed throat, etc. It is also used in the manufacture of lucifer matches, fireworks, and percussion caps.

**Chloric Ether**, a volatile liquid obtained by passing hydrochloric acid gas into alcohol to saturation and distilling the products.

Chlo'rine, an elementary gaseous substance discovered by Scheele in 1774, who named it dephlogisticated marine acid. It was afterward proved by Davy to be a simple body, and from its peculiar yellowish-green color the appellation of chlorine was given to it. It is always found in nature in a state of combination. United with sodium it occurs very largely as the chloride of sodium or common salt, from which it is liberated by the action of sulphuric acid and manganese dioxide. Chlorine is a very heavy gas, being about two and a half times as heavy as ordinary air; it has a peculiar smell, and irritates the nostrils most violently when inhaled, as also the windpipe and lungs. It exercises a corrosive action upon organic tissues. It is not combustible, though it supports the combustion of many bodies, and, indeed, spontaneously burns several. In combination with other elements it forms chlorides, which act most important parts in many manufacturing processes. This gas may be liquefied by cold and pressure, when it becomes a transparent, greenish-yellow, limpid liquid. Chlorine is one of the most powerful bleaching agents, this property belonging to it through its strong affinity for hydrogen. Hence in the manufacture of bleaching powder it is used in immense quantities. When applied to moistened colored fabrics it acts by decomposing the moisture present, the oxygen of which then destroys the coloring matter of the cloth, etc. It is a valuable disinfectant where it can be conveniently applied, as in the form of chloride of lime.

**Chlo'rite**, a mineral of a grass-green color, opaque, usually friable or easily pulverized, composed of little spangles, scales, prisms, or shining small grains, and consisting of silica, alumina. magnesia, and protoxide of iron. It is closely allied in character to mica and talc. There are four sub-species—chlorite earth, common chlorite, chlorite slate, and foliated chlorite.

**Chlo'roform**, the perchloride of formyle, a volatile, coloriess liquid of an agreeable, fragrant, sweetish, apple taste and smell, of the specific gravity of 1.48, and discovered by Soubeiran and Liebig in 1832. It is prepared by cautiously distilling together a mixture of alcohol, water, and chloride of lime or bleaching powder. Its use as an anæsthetic was introduced in 1847 by Professor (afterward Sir) James Y. Simpson, of Edinburgh. For this purpose its vapor is inhaled. The inhalation of chloroform first produces slight intoxication; then, frequently, slight muscular contractions, unruliness, and dreaming; then loss of voluntary motion and consciousness, the patient appearing as if sound asleep; and at last, if too much be given, death by coma and syncope. When skillfully administered in proper cases it is considered one of the safest of anæsthetics; but it requires to be used under certain precautions, as its application has frequently proved fatal. Chloroform is a powerful solvent, dissolving resins, wax, iodine, etc., as well as strychnine and other alkaloids.

Chio'rophyll, the green coloring matter of plants. It plays an important part in the life of the plant, as it breaks up the carbonic acid gas taken in by the stomata of the leaves into its two elements, carbon and oxygen, returning the oxygen to the air, and converting the carbon with the water obtained from the roots into starch. Light is indispensable to the formation of chlorophyll, and hence arises the etiolation or bleaching of plants by privation of light, either by the art of the gardener or from accidental causes.

**Choate**, RUFUS (1799–1859), American jurist and orator. In 1830 he was elected to Congress; also in 1832. In 1841 he succeeded Daniel Webster in the U. S. Senate, serving until 1845. In many respects he was the most scholarly of American public men, and among the greatest forensic advocates America has produced.

Choc'olate, a paste composed of the kernels of the cacao-tree, ground and combined with sugar and vanilla, cinnamon, or other flavoring substance; also a beverage made by dissolving chocolate in boiling water or milk. It was used in Mexico long before the arrival of the Spaniards, and is now largely used in South America, Spain, Italy, and Germany, but in Britain cocoa, which is a preparation from the same fruit, is much more common. The cocoa bean, from which chocolate is made, is the seed of a mushy pod which is the fruit of the cacao or cocoa tree. This tree is found in Central America, Mexico, South America, the West and East Indies, Brazil, and Caracas. The cocoa bean is about the size of a pecan nut. The kernel of the bean is called the nib, and from the nibs chocolate and cocoa are made. The beans are roasted in a cylindrical machine which turns slowly over a coal fire. The roasting is for the purpose of making the shells brittle so they will come off easily. After the roasting process the beans are allowed to cool and are then carried to a machine known as a "cracker and fanner." This machine cracks and removes the shell and then fans the shell out of the way, leaving the nibs. The nibs are then put into a grinding machine. The bean is about half oil and this is apparent when the nibs are fed into the grinding machine. The first revolution sends out thick chocolate paste. As it comes from the stones the chocolate looks just as it does when it is mixed for chocolate cake. The ground chocolate is then placed in kettles for the purpose of completing the stirring up. Afterward it is placed in little tins and carried to the cooling room to solidify into cakes, which are then wrapped for shipment.

Choc'taws, a North American Indian tribe

now settled on a portion (10,450 sq. mi.) of the Indian Territory on the Red River. They formerly inhabited what is now the west part of Alabama and south part of Mississippi. They cultivate the soil, are partially civilized, having regular constitution prefaced with a bill of rights, courts of justice, books and newspapers.

**Choiseul** (shwä-seul), an ancient French family which has furnished many distinguished individuals. One of the best known is Etienne François, duke of Choiseul-Amboise(1719-1785). After distinguishing himself on various occasions in the Austrian War of Succession, he returned to Paris, where his intimacy with Madame de Pompadour furnished the means of gratifying his ambition. After having been ambassador at Rome, and at Vienna, he became in reality prime minister of France. He negotiated the famous Family Compact which reunited the various members of the Bourbon family, and restored Corsica to France. His fall was brought about in 1770 by a court intrigue, supported by Madame du Barry, the new favorite of the king. He was banished to his estates, but his advice in political matters was frequently taken by Louis XVI.

**Choke-damp** (or After-damp), the name given to the irrespirable gas found in coal mines after an explosion of fire-damp or light carbureted hydrogen.

**Cholera** (kol'é-ra), an acute contagious and very fatal disease. In its more ordinary form it commences with sickness, vomiting, or perhaps two or three loose evacuations of the bowels; after which follow a sense of burning at the præcordia, an increased purging and vomiting of a white or colorless fluid, great prostration of strength, spasms at the extremities, which increase in violence with the vomiting and purging. Such cases may last from twelve to thirty-six hours; after this the patient generally sinks into a state of extreme collapse, and this stage in most cases passes by a gradual transition into a febrile one, which in a major-ity of instances proves fatal. Sometimes the patient is suddenly stricken down and dies, collapsed within a few hours without diarrhœa or vomiting. This disease is endemic in certain parts of Asia (hence it is sometimes called Asiatic cholera), and is liable to spread to other parts of the world, usually by the ordinary channels of commercial intercourse. It first appeared in Europe in 1829, and reached Britain in 1831, spreading thence to America. Western Eu-rope was again visited by it in 1847, 1853, 1865, 1873, 1875, and in 1885, when Spain and the south of France suffered severely.

The primary and essential element in the production of cholera has been ascertained to be a constituent of the excreta of cholera patients. Whether this particular substance is the germ of a fungus or other form of minute life is not quite certain, but that it is an organism capable of propagating itself when it is taken into the alimentary canal in food. impure water, or the like, is beyond a doubt. Doctor Koch asserts that the essential cause is a bacillus, having the form of a curved rod,

hence called the common bacillus, and that the disease is caused by the multiplication of this organism in the small intestines. The fact that great numbers are present in persons suffering from cholera is generally admitted, but it is doubted by other experts if they do actually produce the disease. A method of protective inoculation against cholera has been lately tried in Spain, but with small success. The contagion of cholera is not so likely to be conveyed by personal intercourse as by residence in an infected district. Sanitary measures have proved to be the only efficacious means of arresting an epidemic; insanitary conditions decidedly favor it.

What is called *cholera morbus* is a bilious disease, long known in most countries, and is characterized by copious vomiting and purging, with violent griping, cramps of the muscles of the abdomen and lower extremities, and great depression of strength. *Cholera infantum* (infants' cholera) is the name sometimes given to a severe and dangerous diarrhoma to which infants are liable in hot climates or in the hot season.

**Cholesterine** (kö-les'ter-in), a substance found in bile, blood, etc., which may be obtained in the form of beautiful pearly crystalline scales, without taste and odor. It is widely distributed in the animal economy, being essential to the brain and nerve substance, and having been found in milk, and many portions of the body, both as a normal and a pathological constituent.

**Cholos** (chō' lõs), in Peru, the name for those who are partly of white, partly of Indian parentage, the most numerous class of the community.

**Cholula** (chō-lö'là), a town of Mexico, 60 mi. s.e. by e. of Mexico, formerly a large city, the seat of the religion of the ancient Mexicans, with more than 400 temples. One of these temples still remains, built in the form of a pyramid, each side of its base measuring 1,440 ft., and its height in all 164 ft. On the top is a chapel of Spanish origin. Pop. 10,000.

a chapel of Spanish origin. Pop. 10,000. **Chonos Archipelago** (chō' nōs), a group of islands lying off the west coast of Patagonia. Two are large, but they are all barren and scantily inhabited:

**Chopin** (sho-pan), FRÉDÉRIC FRANÇOIS (1810 -1849), pianist and musical composer, of French extraction, was b. at Warsaw, went to Paris in 1831 on account of the political troubles of Poland, and died there. He wrote numerous pieces for the pianoforte, chiefly in the form of nocturnes, polonaises, waltzes, and mazurkas; all of which display much poetic fancy, abounding in subtle ideas with graceful harmonic effects.

**Chopine** (chop-ēn'), a very high shoe or elevated clog, introduced into England from Venice, in the reign of Queen Elizabeth, and which became the fashionable wear of court ladies during that reign. They were made of wood covered with leather of sundry colors, white, red, yellow, and sometimes gilt. Some of them were of great height, as much as 18 in., the

height of the chopine being seemingly regarded as a mark of the rank of the wearer.

**Chop Sticks**, the Chinese substitute for our knife, fork, and spoon at meals, consisting of two smooth sticks of bamboo, wood, or ivory, which are used for conveying meat to the mouth with wonderful dexterity.

**Choragus** (ko-rā-'), a name given by the Greeks to the leader or director of the choruses furnished for the public festivals and who also defrayed the expenses of the chorus. The choragus who was adjudged to have performed his duty best received a tripod of brass, for which he had to build a monument, on which it was placed. A street in Athens which contained a great number of these choragic monuments was called the "street of the tripods." A handsome choragic monument was erected near the Art Palace at the World's Columbian Exposition in Chicago in 1893.

**Chord** (kord), in music, the simultaneous combination of different sounds, consonant or dissonant. The common chord consists of a fundamental or bass note with its third and fifth. When the interval between the bass note and its third is two full tones the combination is a major chord; when the interval is a tone and a half the combination is termed a minor chord; when the intervals between the bass note and its third and the third and the fifth are each a tone and a half, the chord is The tonic chord is made up called diminished. of the key note and its third and fifth; the dominant chord consists of the dominant or fifth of the scale accompanied by its third and fifth; the subdominant chord has for its root or bass the subdominant or fourth of the scale, accompanied with its third and fifth. In geom. a chord is a straight line drawn, or supposed to extend, from one end of an arc of a circle to the other.

**Chorley** (chor'li), a market town of England, Lancashire, 20 mi. n.w. of Manchester, with manufactures of cotton goods, calico printing, and dye-wood works, floor cloth works, iron foundries, etc. In the vicinity are coal, lead, and iron mines. Pop. 23,082.

Chorus (kô' rus), originally an ancient Greek term for a troop of singers and dancers, intended to heighten the pomp and solemnity of festivals. During the most flourishing period of ancient tragedy (B.C. 500-400) the Greek chorus was a troop of males and females, who, during the whole representation, were spectators of the action, never quitting the stage. In the intervals of the action the chorus chanted songs, which related to the subject of the performance. Sometimes it even took part in the performance, by observations on the conduct of the personages, by advice, consolation, exhortation, or dissuasion. In the beginning it consisted of a great number of persons, sometimes as many as fifty; but the number was afterward limited to fifteen. The exhibition of a chorus was in Athens an honorable civil charge, and was called *choragy*. Sometimes the chorus was divided into two parts, who sung alternately. The divisions of the chorus were not stationary, but moved from one side of the

stage to the other; from which circumstance the names of the portions of verse which they recited, *strophe*, *antistrophe*, and *epode*, are derived. In music, the chorus is that part of a composite vocal performance which is executed by the whole body of the singers, in contradistinction to the solo airs, and concerted pieces for selected voices. The singers who join in the chorus are also called the chorus. The term is also applied to the verses of a song in which the company join the singer in repeating certain couplets or verses at certain periods in a song.

**Chose in Action** (Fr. *chose*, "a thing") is one of the two great classes of what the English law calls chattels personal. The one class is "choses in possession," such as goods, household furniture, cattle, etc; the other class is "choses in action," such as the right to sue for a debt, a legacy, damages, etc. In the U. S. that quality of a chose in action rendering it unassignable at common law is fast disappearing. In some states a chose in action may not only be assigned, but the assignee may bring a suit for possession in his own name; while in others the name of the assignor is used as plaintiff in the action, to the use of the assignee. Courts of law generally follow the rules of equity in this respect.

Chosroes I (kos'ro-es) (A. D. 531-579), surnamed the "Just," the greatest of the Sassanid kings of Persia. At his accession Persia was involved in a war with the Emperor Justinian, which Chosroes terminated successfully, obliging Justinian to purchase peace by the payment of a large sum of money. In 540, however, jealous of the victories of Belisarius. the great general of the empire, Constantine violated the peace, invaded Syria, laid Antioch in ashes, and returned home laden with spoils. The war continued till 562, when the emperor again purchased peace by an annual tribute of 30,000 pieces of gold. The peace continued for ten years, when the war was renewed with Justin, the successor of Justinian, when Chosroes was again successful. The following emperor, Tiberius, at length completely defeated the Persians in 578.

**Chota Nagpore** (or Chutia Nágpur), a divislon of British India, presidency Bengal, divided into the districts of Lohardaga, Hazaribagh, Singbhum, and Manbhum, and 9 feudatory states. Total area 43,020 sq. mi.; pop. 4,003,991.

**Chouans** (shö-än), a name given to the royalist peasantry of Brittany and Lower Maine, who carried on a petty warfare against the republican government from an early period of the French Revolution. The name was finally extended to all the Vendeans. The name was derived from the first chief of the Chouans, Jean Cottereau, who with his three brothers organized these bands in 1792. Cottereau had joined a band of dealers in contrabaud salt, and acquired the surname *Chouan* from the cry of the screech owl, which he used as a signal with his companions. He was killed in an engagement with the republican troops in 1794. The Chouans were not suppressed till 1799, and even after that occasional spurts of insurrection occurred down till 1830, when they were finally put down.

till 1830, when they were finally put down. **Chough** (chuf) (Cornish Chough, or Redlegged Crow), a bird belonging to the crow family, but nearly allied to the starlings. *F.* graculus is the only British or European



species, and frequents, in England, chiefly the coasts of Cornwall. Its general color is black, contrasting well with the vermillion red of the beak, legs, and toes. There are other species, natives of Australia, Java, etc.

Christ, a title of our Saviour, now used almost as a name or part of his name.

**Christchurch**, a town of England, county of Hampshire, 21 mi. s.w. of Southampton. There is a fine old priory church, dating from the time of William Rufus, with a magnificent stone altar screen. Pop. 53,270.

**Christchurch**, a town of New Zealand, capital of the province of Canterbury, and the see of the primate of New Zealand, is situated on the Avon River, 7 mi. from Port Lyttelton, with which it has railway communication. It contains a number of handsome buildings, among which are the provincial government offices, the cathedral, St. Michael's Church, the supreme court, hospital, museum, town library, etc. There are a fine park, a botanic garden, and high class educational and other institutions. Pop. 16,223, or including extensive suburbs, 47,846.

Christ Church College, OXFORD, a college protected by Cardinal Wolsey, and established in 1546 by Henry VIII. It has the patronage of above ninety livings.

**Christian**, the name of nine Danish kings. Of these CHRISTIAN II (1480-1559), king of Denmark, Norway, and Sweden, attained the throne in 1513, and in 1518 usurped the throne of Sweden, from which he was expelled by Gustavus Vasa in 1522. He was deposed by his Danish subjects in 1523, and retired to the Netherlands, whence he returned in 1531 with an army, but was defeated, and kept in confinement till his death. CHRISTIAN IV (1577-

1648), king of Denmark, son of Frederick II and the Princess Sophia of Mecklenburg, succeeded to the throne as a minor in 1588. In the Thirty Years' War he was beaten by Tilly at Lutter in 1626, but afterward, in conjunction with Gustavus Adolphus, obtained the treaty of Lübeck, 1628. He has the merit of having laid the foundation of the Danish navy, extended the trade of his subjects to the East Indies, and fitted out several expeditions for the .

Christian Era, the great era now almost universally employed in Christian countries for the computation of time. It is generally supposed to begin with the year of the birth of Christ; but that event seems to have taken place four years before the present established beginning of the era. Time before Christ is marked B.C., after Christ A.D. The era is computed from January 1, in the fourth year of the 194th Olympiad, and the 753d from the building of Rome. It was first used by Dionysius, a Syrian monk, in the sixth century, but did not become general until about the middle of the fifteenth century.

Christiania, a city and port, the capital of Norway, province Aggershuus or Christiania, at the head of the long, narrow inlet called Christiania Fjord, about 60 mi. from the open sea or Skagerrack. The houses are mostly of brick and stone, generally plain buildings, devoid of architectural pretension. Important public buildings are the royal palace, the house of representatives or Storthing, the governor's palace and cathedral. An interesting building is the fine old castle of Aggershuus, with its church and citadel crowning a point jutting out into the fjord. Attached to the university-the only one in Norway, opened in 1813—is a museum, containing a fine col-lection of antiquities. The manufactures of the city consist of woolen cloth, ironware, tobacco, paper, leather, soap, spirits, glass, etc., and there are extensive breweries. The exports are principally timber and iron. The environs are exceedingly beautiful. Pop. 122,424.

Christianity, the religion instituted by Jesus Christ. Though the great moral principles which it reveals and teaches, and the main doctrines of the gospel, have been preserved without interruption, the genius of the differ-ent nations and ages have materially colored its character. The first community of the followers of Jesus was formed at Jerusalem soon after the death of their Master. Another at Antioch in Syria first assumed (about 65) the name of Christians; and the travels of the apostles spread Christianity through the provinces of the Roman Empire. Palestine, Syria, Asia Minor, Greece, the islands of the Mediterranean, Italy, and the northern coast of Africa, as early as the first century, contained societies of Christians. At the end of the third century almost one half of the inhabitants of the Roman Empire, and of several neighboring countries, professed this belief. While Christianity as a system was thus spreading, many heretical branches had sprung from the main trunk. From the Gnostics, who date from the days of the apostles, to the Nestorians of the fifth century, the number of sects was large, and some of them exist to the present day. The most important events in the subsequent history of Christianity are the separation of the Eastern and Western churches early in the eighth century; and the Western reformation, which may be said to have commenced with the sectaries of the thirteenth century, and ended with the establishment of Protestantism in the sixteenth. The number of Christians now in the world is computed at 450,000,000. Of these about 212,-000,000 are Roman Catholics, 83,000,000 belong to the Greek Church, and 155,000,000 are Protestants. Of the various sects of Protestants the most numerous are the Lutheran, the Calvinistic, and the Anglican Church.

**Christians** (or Christian Connection), the name of a denomination in the U. S. and Canada, adopted to express their renunciation of all sectarianism. They are to be met with in all parts of the country, the number of their churches being estimated at over 1,000. Each church is an independent body; the Scriptures are their only rule of faith, and admission to the church is obtained by a simple profession of belief in Christianity. As a rule they are anti-trinitarians and baptists.

Christian IX, king of Denmark, b. April 8, 1818; succeeded to the throne in 1863. His eldest daughter, Alexandra, is married to the Prince of Wales; his second daughter, Dagmar, is the wife of the reigning czar. and his second son, George, is king of the Hellenes.

**Christian**, prince of Schleswig-Holstein, b. in 1835; married, 1866, the Princess Helena, third daughter of Queen Victoria. He is a general in the British army.

**Christiansand**, a seaport in the south of Norway, with manufactures of tobacco and machinery, brewing, etc., and a considerable export of timber and fish. Pop. 12,749.

**Christiansted**, a fortified town, capital of the island of St. Croix, Danish West Indies, with a good harbor and some trade. Pop. 9,600.

Christi'na, Queen of Sweden (1626-1689), daughter of Gustavus Adolphus. After the death of Gustavus, at Lützen, in 1632, the states-general appointed guardians to the Queen Christina, then but 6 years old. Her education was continued according to the plan of Gustavus Adolphus. She learned the ancient languages, history, geography, politics, and renounced the pleasures of her age in order to devote herself entirely to study. In 1644 she took upon herself the government. A great talent for business, and great firmness of purpose, distinguished her first steps. She terminated the war with Denmark begun in 1644, and obtained several provinces by the treaty concluded at Bromsebro in 1645. Her subjects wished that she should choose a husband, but she manifested a constant aversion to marriage. During this time her patronage of learned men, artists, and the like, was lavish. In 1650 she caused herself to be crowned with great pomp, and with the title of king.

From that time a striking change in her conduct was perceptible. She neglected her ancient ministers, and listened to the advice of ambitious favorites. Intrigues and base passions succeeded to her former noble and use-The public treasure was squanful views. dered with extravagant profusion. In 1654 she abdicated in favor of her cousin Charles Gustavus, reserving to herself a certain income, entire independence, and full power over her suite and household. A few days after, she left Sweden and went to Brussels, where she made a public entry and remained for some time. There she made a secret profession of the Catholic religion which she afterward publicly confirmed in Innsbruck. From Innsbruck she went to Rome, which she entered on horseback in the costume of an Amazon, with great pomp. When the Pope Alexander VII confirmed her she adopted the surname of Alessandra. For some time she resided at Paris, and incurred great odium by the execution of her Italian equerry Monaldeschi for betrayal of confidence. Subsequent attempts which she made to resume the crown of Sweden failed, and she spent the rest of her life in artistic and other studies at Rome. She left an immense art collection and a large number of valuable MSS. Her writings were collected and published in 1752. Christina, Queen-regent of Spain, b. July

**Christina**, Queen-regent of Spain, b. July 21, 1858; second daughter of the late Archduke Charles of Austria. In 1879 she was married to Alfonso XII of Spain, to whom she bore two children; the Infanta Mercedes, and Alfonso, present king of Spain.

Christmas(kris'mas), the festival of the Christian church observed annually on December 25 in memory of the birth of Christ, and celebrated by a particular church service. The time when the festival was first observed is not known with certainty; but it is spoken of in the beginning of the third century by Clement of Alexandria, and in the latter part of the fourth century Chrysostom speaks of it as of great antiquity. As to the day on which it was celebrated, there was long considerable diversity, but by the time of Chrysostom the Western church had fixed on December 25, though no certain knowledge of the day of Christ's birth existed. The Eastern church, which previously had generally favored January 6, gradually adopted the same date. Many believe that the existence of heathen festivals celebrated on or about this day had great influence on its being selected; and the Brumalia, a Roman festival held at the winter solstice. when the sun is as it were born anew, has often been instanced as having a strong bearing on the question. In the Catholic, Greek, Anglican, and Lutheran churches, there is a special religious service for Christmas day; and, contrary to the general rule, a Catholic priest can celebrate three masses on this day. Most other churches hold no special service, but almost everywhere throughout Christendom it is kept as a holiday and occasion of social enjoyment.

Christmas Cards, ornamental cards con-

taining words of Christmas greeting to friends to whom they are sent. The first of them appeared about 1862, and consisted of pictures of robins, holly, etc.; since then highly artistic designs have been introduced, and their manufacture is considerable in the U. S., Germany, France, and England. Immense quantities of them pass through the post office every Christmas.

**Christmas Carol**, a carol or song descriptive of the birth of Christ, or of incidents connected with it, sung specially at Christmas.

**Christmas Rose**, the black hellebore, so called from its flower, which resembles a large white rose. Its foliage is dark and evergreeu, and the plant blossoms during the winter months.

**Christmas Tree**, a small fir tree lighted up by means of tiny candles of colored wax, or small Chinese lanterns, ornamented with flags. tinsel ornaments, etc., and hung all over with gifts for children.

Christophe (kris-tof), HENRI (1767-1820), king of Hayti, was b. in the West Indies, and was employed as a slave in St. Domingo on the outbreak of the blacks against the French in 1793. From the commencement of the troubles he signalized himself by his energy, boldness, and activity in many bloody engagements. Toussaint-L'Ouverture gave him the commission of brigadier general, and he was largely instrumental in driving the French from the island. After the death of Dessalines, Christophe became master of the northern part of the island. In 1811 he had himself proclaimed king of Hayti by the name of Henri I. He also sought to perpetuate the name by the compilation of the Code Henri-a digest founded upon the Code Napoleon. His cruelty provoked a revolt, which being unable to quell he shot himself.

**Christopher's,** ST., a British island in the West Indies, one of the Leeward Islands, 23 mi. in length, and in general about 5 in breadth: area 68 sq. mi. The interior consists of many rugged precipices and barren mountains. Of these the loftiest is Mount Misery (evidently an extinguished volcano), 4,100 ft. high. The chief town, a seaport with open roadstead, is Basse-Terre. The island has a legislature of its own, with an executive subordinate to the governor of the Leeward Islands, resident in Antigua. It was discovered by Columbus in 1493, and colonized by the English in 1623. Pop. 20,127.

**Christ's College,** one of the colleges of the University of Cambridge, England, founded originally by Henry VI, but remodeled and liberally endowed by Margaret, countess of Richmond and Derby, mother of Henry VII, in 1505.

**Chromat** ic, in music, a term applied to notes and peculiarities not belonging to the diatonic scale. Thus a *chromatic chord* is a chord which contains a note or notes foreign to diatonic progression; *chromatic harmong*, harmony consisting of chromatic chords. The *chromatic scale* is a scale made up of thirteen successive semitones, that is, the eight diatonic tones and the five intermediate tones.

**Chrome iron Ore,** an ore of chromium, is a mineral of very considerable importance as affording chromate of potash, whence are obtained various other preparations of this metal used in the arts.

**Chrome Yellow,** a chromate of lead, a beautiful pigment, varying in shade from deep orange to a very pale canary yellow, much used in the arts.

Chro'mium, a metal which forms very hard steel-gray masses; it never occurs native, but may be obtained by reducing the oxide. In its highest degree of oxidation it forms a compound of a ruby-red color. By itself it has received no practical applications. It takes its name from the various and beautiful colors which its oxide and acid communicate to minerals into whose composition they enter. It is the coloring matter of the emerald and beryl. Chromium is employed to give a fine, deep green to the enamel of porcelain, to glass, etc. The oxide of chromium is of a bright grassgreen or pale yellow color. This element was originally discovered in 1797 by Vanquelin. in the native chromate of lead of Siberia. See preceding articles.

**Chromo-lithography**, a method of producing a colored or tinted lithographic picture, by using various stones having different portions of the picture drawn upon them with inks of various colors and so arranged as to blend into a complete picture. Sometimes as many as twenty different colors are employed. In printing, lighter shades are printed off first and the darkest last.

Chro'mosphere, the name given to the gaseous envelope which exists round the body of the sun, through which the light of the photosphere, an inner envelope of incandescent matter, passes. During total eclipses it had been observed that a red-colored envelope surrounded the sun, shooting up to great distances from the surface. It seems to have been more commonly described as "redcolored protuberances" and "red flames. To this red envelope the name chromosphere was given by Mr. Lockyer. The light from it is much fainter than that from the photo-sphere; and till 1868, when M. Janssen and Mr. Lockyer almost simultaneously pointed out a method of viewing it, it was never seen except during eclipses. The chromosphere and its prominences, when examined with the telespectroscope, exhibits a spectrum of bright lines, due to incandescent gases. The most elevated portions consist entirely or almost entirely of hydrogen, the lightest of the gases. Lower down are found the gases or vapors of the heavier metals - of sodium, magnesium, barium, iron, and others. The lower the layer of the chromosphere examined the more densely is the spectrum filled with lines of metals, and in the prominences the red hydrogen flames tower high above all.

**Chron'icles**, BOOKS OF, two books of the Old Testament which formed only one book in the Hebrew canon, in which it is placed last. Its division into two parts is the work of the

Seventy. The Hebrew name means "acts of the days," and is thus much the same as our "journals." The title given to it by the Seventy was Paraleipomena, meaning "things omitted." The name Chronicles was given to it by Jerome. The book is one of the latest compositions of the Old Testament, and is supposed to have been written by the same hand as Ezra and Nehemiah. According to its contents the book forms three great parts: 1, genealogical tables; 2, the history of the reigns of David and Solomon; 3, the history of the kingdom of Judah from the separation under Rehoboam to the Babylonian captivity, with a notice in the last two verses of the permission granted by Cyrus to the exiles to return home and rebuild their temple. The Chronicles The Chronicles present many points of contact with the earlier scriptures, historical and prophetical, more especially, however, with the books of Samuel and of Kings.

**Chron ogram**, a device by which a date is given in numeral letters by selecting certain letters of an inscription and printing them larger than the others, as in the motto of a medal struck by Gustavus Adolphus in 1632: ChrIstVs DVX: ergo trIVMphVs; where the values of C and the other capitals regarded as Roman numerals gives the required figure when added together.

Chron ograph, the name given to various devices for measuring and registering very minute portions of time with extreme precision. Benson's chronograph is, in principle, a lever watch with a double secondhand, the one superimposed on the other. The outer end of the lowermost hand has a small cup filled with a black viscid fluid, with a minute hole at the bottom, while the corresponding end of the uppermost is bent down so as just to reach the hole. At the starting of a horserace, the observer pulls a string, whereupon the bent end of the upper hand passes through the hole and makes a black mark on the dial, instantly rebounding. Again, as each horse passes the winning-post the string is redrawn and a dot made, and thus the time occupied by each horse is noted. This chronograph registers to one tenth of a second. Strange's chronograph is connected with the pendulum of an astronomical clock, which makes a mark on a sheet of paper at the beginning and end of each swing. By touching a spring on the appearance of a particular star in the field of a telescope, an additional dot is made intermediate between the two extreme ones, and by measuring the distance of this from either of these extremes the exact time can be ascertained to one hundredth of a second. Schultze's chronograph, in which electricity is applied, is yet far more precise, registering time to the five-hundred-thousandth part of a second.

**Chronol ogy,** the science which treats of time, and has for its object the arrangement and exhibition of historical events in order of time and the ascertaining of the intervals between them. Its basis is necessarily the method of measuring or computing time by

#### Chronometer

regular divisions or periods, according to the revolutions of the earth or moon. The motions of these bodies produce the natural division of time into years, months, and days. As there can be no exact computation of time or placing of events without a fixed point from which to start, dates are fixed from an arbitrary point or *epoch*, which forms the beginning of an *era*. The more important of these are the creation of the world among the Jews; the birth of Christ among Christians; the Olympiads among the Greeks; the building of Mome among the Romans; the Hejira or flight of Mohammed among the Mohammedans, etc.

Chronom'eter, any instrument that measures time, as a clock, watch. or dial; but, specifically, this term is applied to those timekeepers which are used for determining the longitude at sea, or for any other purpose where an accurate measure of time is required, with great portability in the instru-The chronometer differs from the ment. ordinary watch in the principle of its escapement, which is so constructed that the balance is free from the wheels during the greater part of its vibration, and also in being fitted with a "compensation adjustment," calculated to prevent the expansion and contraction of the metal by the action of heat and cold from affecting its movements. Marine chronometers generally beat half seconds, and are hung in gimbals in boxes 6 or 8 in. square. The pocket chronometer does not differ in appearance from a watch except that it is somewhat larger.

**Chronoscope**, an instrument for measuring the duration of extremely short-lived phenomena, such as the electric spark; more especially the name given to instruments of various forms for measuring the velocity of projectiles. **Chrys'alis**, a form which butterflies, moths,

and most other insects assume when they change from the state of larva, or caterpillar, and before they arrive at their winged or perfect state. 1ii the chrysalis form the animal is in a state of @ rest or insensibility, and exists without nutriment, the length of time varying with the species and season. During this period an elaboration is going on in the interior of the chrysalis, giving to the organs of the future animal their proper development

Chrysan'themum, a large genus of composite plants consisting of herbs or shrubs with single, largestalked, yellow flowers or with many small



or with many small Yellow Chrysanthemum.

#### Church

flowers; the rays are sometimes white. Two species are common weeds in Britain, the oxeye daisy, a meadow plant with white ray flowers, and the corn marigold, a cornfield weed with golden-yellow ray-flowers. The chrysanthemum of gardens is a Chinese half shrubby plant whose numerous varieties constitute one of the chief ornaments of our American gardens in October, November, and December.

Chrys'olite, a mineral composed of silica. magnesium, and iron. Its prevailing color is some shade of green. It is harder than glass, but less hard than quartz; often transparent. sometimes only translucent. Very fine specimens are found in Egypt and Brazil, but it is not of high repute as a jeweler's stone.

not of high repute as a jeweler's stone. **Chrysophan'ic Acid**, the yellow coloring matter of rhubarb. With potash it gives a fine. purple solution, and thus affords a delicate test for the presence of alkalies.

Chrys'ostom, JOHN, ST. (344-407) ("golden mouthed"), a celebrated Greek father of the church. He studied eloquence with Libanius, the most famous orator of his time, and scon excelled his master. After having studied philosophy with Andragathius he devoted himself to the Holy Scriptures, and determined upon quitting the world and consecrating his life to God in the deserts of Syria. He spent several years in solitary retirement, studying and meditating with a view to the church.

**Chub**, a European river fish, of the genus Cyprinus or carps; or, as some regard it, of the sub-genus *Leuciscus*. The body is oblong. nearly round; the head and back green, the sides silvery, and the belly white. It frequents deep holes in rivers shaded by trees.



but in warm weather floats near the surface, and furnishes sport for anglers. It is indifferent food, and rarely attains the weight of 5 lbs. Allied American species receive the same name.

**Chuprah** (or Chapra) (chap-rä), a town, Hindustan, division of Bahar, on the Gogra. about a mile above its confluence with the Ganges: extending along the river for nearly four miles, with an active trade in cotton, sugar, and saltpeter. Pop. 51,670.

**Chuquisaca** (chö-kē-sà'kà) (or Sucre), a city of South America, the capital of Bolivia; well situated on a plateau between the Amazon and La Plata rivers, 9,343 ft. above the sea level. It has a cathedral and a university. It was founded by one of Pizarro's officers in 1539. Pop. formerly 27,000, now est. 12,000. The province of Chuquisaca has an area of 72,-706 sq. mi.; a pop. of 274,000.

Church, FREDERIC EDWIN, American artist. b. in Hartford, Conn., May 4, 1826. He went to New York, and in 1849 was elected a mem-

ber of the National academy. In 1853-57 he traveled in South America. Later he went on an expedition to the coast of Labrador, and on his 'return painted his great picture *Icolergs*. He traveled through the West Indies, Europe, and Palestine in 1866. His best work is the *Great Fall at Niagara*. For many years he has spent his winters in Mexico. He has studios in New York and on the Hudson.

Church, a word which in its widest sense denotes the whole community of Christians, and was thus used by the New Testament writers. In more restricted significations it denotes a peculiar section of the Christian community differing in doctrinal matters from the remainder, as the Roman Catholic Church, the Protestant Church, etc.; or to designate the leading church of a nation, as the English, Scotch, or French Church. In yet another sense it signifies the edifice appropriated to Christian worship. After the conversion of Constantine the basilicæ or public halls and courts of judicature and some of the heathen temples were consecrated as Christian churches. When churches came to be specially built for Christian worship their forms were various - round, octagonal, etc. Later on the form with the cross aisle or transept became common. Early British churches were built of wood; the first stone churches erected being that 'of Whithorn, Galloway (sixth century), and that of York (seventh century). Any building set apart for religious ordinances is called a church, though when of a minor kind it is usually designated a *chapel*. The term church, however, is often restricted to the buildings for worship connected with a national establish-ment. They are classed as *cathedral*, when containing a bishop's throne: *collegiate*, when served by a dean and chapter; conventual or minster, when connected with a convent or monastery; abbey or priory, when under an abbot or prior; and parochial, when the charge of a secular priest.

Churchill, CHARLES (1731-1764). English poet and satirist. He was educated at Westminster School, but made so bad a use of his time that he was refused admission to the University of Oxford. An early and imprudent marriage was soon followed by his admission to holy orders and a Welsh curacy of \$150 a year. On the death of his father he obtained his curacy of St. John's, Westminster; but owing to his love of gaiety he was soon overwhelmed with debt, and had to compound with his creditors. In 1761 he published anonymously a poem called The Rosciad, a clever satire on the chief actors of the day. Its success was increased by the vehemence with which the players replied to it, and Churchill seized the opportunity of giving the town a new satire, The Apology. A course of dissipation and intem-perance followed, which excited much animadversion, and elicited from him his next satire, Night. Churchill now threw aside all regard for his profession, and became a complete man about town and a professional political satirist. His other productions include The Ghost, in which Dr. Johnson is satirized.

Churchill, RANDOLPH HENRY SPENCER, LORD (1849-1805), second son of the sixth duke of Marlborough. Having entered Parliament in 1874, by 1884 he had risen to the position of a recognized leader of the Conservative party, and in 1885 became Indian secretary in Lord Salisbury's government. On the defeat of Gladstone's Irish Hill in 1886 Churchill became leader of the House of Commons and chancellor of exchequer, posts which he resigned in December, 1880.

**Churchill River**, a river of the Northwest Territories of Canada, which rises in La Crosse Lake, forms or passes through various lakes or lake-like expansions, the largest being Big or Indian Lake, and enters Hudson's Bay after a northeasterly course of about 800 mi. It is called also Missinippi or English River.

**Churn**, a vessel for preparing butter from cream or milk, in which cream is agitated to separate its buttery globules in a solid mass from the fluid portions. Churns are made of various forms; in a very common kind a perforated circular board is made to move up and down in a vessel containing the cream, and having the shape of the frustum of a cone by means of a long stalk or rod fixed to it, called the churn staff. In others the churning is performed by a circular motion.

**Churubusco** (chu-ru-bus'ko), a village 6 mi. s. of Mexico, the scene of a battle between the Mexicans under Santa Anna, and the U. S. troops under Scott, Aug. 20, 1847, in which the former were defeated.

**Chusan Islands**, a group of islands on the east coast of China, the largest in the archipelago having the name Chusan, and being about 21 mi. long, and from 6 to 11 broad. Pop. about 200,000. Chief town Ting-hae, pop. 40,000. Rice and tea are the principal products. From its situation near the mouths of the Yang-tse-kiang, which river forms the great channel of communication with the capital of the empire, Chusan is considered as the key to China, and was temporarily taken possession of by the British in 1840, 1841, and 1860. The sacred island of Pu-tu to the east of the above is covered with Buddhist temples, monasteries, etc., and is entirely inhabited by priests.

**Chyme** (kim), food after it has been digested in the stomach. In the stomach it forms a pulpy mass which passes on into the small intestine, and being acted on by the bile, pancreatic fluid, and intestinal juice, is separated into chyle and non-nutritious matters, which latter are carried off by the evacuations.

**Cialdini,** ENRICO, Italian soldier, b. in Modena Aug. 8, 1811; fought in the Austro-Italian War of 1849 and in the Crimea. In 1860 he defeated the Papal troops, and in 1861 took Gaeta and Messma. He became general of the army and viceroy of Naples, was made senator in 1864 and fought against the Austrians in 1866. In 1870 he annexed the States of the Church to Italy, and in 1876 became ambassador at Paris. He resigned the position in 1881.

**Cibber,** COLLEY (1671-1757), a dramatic writer and actor. He took to the stage in 1689. His first dramatic effort, *Love's Last Shift*, appeared in 1695: and it was followed by *Woman's Wit*, the *Careless Husband*, and the *Nonjuror*, of which the *Hypocrite* of the modern stage is a new version. A court pension and the appointment of poet-laureate drew upon him the rancor of the wits and poets of the day, including Pope.

**Cica'da**, the popular and generic name of certain insects belonging to the order Hemiptera, suborder Homopotera, of many species. The males have on



cies. The males have on each side of the body a kind of drum, with which they can make a considerable noise. This, regarded as the insect's song, was much admired by the ancients, and is frequently referred to by their poets. The largest European species are about an inch long, but some American species are much larger, and can be heard a mile off. They are nearly all natives of tropical or warm temperate regions.

Cicada.

**Cicely** (sis'e-li), a popular name applied to several umbelliferous plants. Sweet cicely, or sweet chervil, is a plant common to Britain and in other parts of Europe. It was formerly used in medicine, and in some parts of Europe is used as an ingredient in soups. Sweet cicely is found in our woods from Canada to Virginia.

Cicero, MARCUS TULLIUS (B. C. 106-43), the greatest Roman orator. His family was of equestrian rank, and his father, though living in retirement, was a friend of some of the chief public men. He received the best education available. At the age of twenty-five he came forward as a pleader. He visited Greece B. C. 79, conversed with the philosophers of all the schools, and profited by the instruction of the masters of oratory. Here he formed that close friendship with Atticus of which his letters furnished such interesting evidence. 'He also made a tour in Asia Minor and remained some time at Rhodes, where he visited the most distinguished orators and took part in their exercises. On his return to Rome his displays of eloquence proved the value of his Grecian instruction, and he became one of the most distinguished orators in the forum. In B. c. 76 he was appointed quæstor of Sicily, and behaved with such justice that the Sicilians gratefully remembered him and requested that he would conduct their suit against their governor Verres. He appeared against this powerful robber, and the crimes of Verres were painted in the liveliest colors in his immortal speeches. Seven of the Verrine orations are preserved, but only two of them were delivered, and Verres went into voluntary exile. After this suit Cicero was elected to the office of ædile in B.C. 70, became prætor in 67, and consul in 63. It was now that he succeeded

in defeating the conspiracy of Catiline, after whose fall he received greater honors than had ever before been bestowed upon a Roman citizen. He was hailed as the savior of the state and the father of his country, and thanksgivings in his name were voted to the gods. But Cicero's fortune had now reached the culminating point. The Catilinarian conspirators who had been executed had not been sentenced according to law, and Cicero, as chief magistrate, was responsible for the irregularity. Publius Clodius, the tribune of the people, raised such a storm against him that he was obliged to go into exile (B.c. 58). On the fall of the Clodian faction he was recalled to Rome, but he never succeeded in regaining the influence he had once possessed. In B. c. 52 he became proconsul of Cilicia, a province which he administered with eminent success. As soon as his term of office had expired he returned to Rome (January, B. c. 49), which was threatened with serious disturbances owing to the rupture between Cæsar and Pompey. He espoused the cause of Pompey, but after the battle of Pharsalia he made his peace with Cæsar, with whom he continued to all appearance friendly, and by whom he was kindly treated, until the assassination of the latter (44 B. c.). He now hoped to regain his political influence. The conspirators shared with him the honor of an enterprise in which no part had been assigned him, and the less he had contributed to it himself the more anxious was he to justify the deed and pursue the advantages which it offered. Antony having taken Cæsar's place, Cicero composed those admirable orations against him, delivered in B.C. 43, which are known to us by the name of Philippics (after the speeches of Demosthenes against Philip of Macedon). His implacable enmity towards Antony induced him to favor young Octavianus, who professed to entertain the most friendly feeling toward him. Octavianus, however, having possessed himself of the consulate, and formed an alliance with Antony and Lepidus, Cicero was proscribed. In endeavoring to escape from Tusculum, where he was living when the news of the proscription arrived, he was overtaken and murdered by a party of soldiers: and his head and hands were publicly exhibited in the forum at Cicero's eloquence has always re-Rome. mained a model. After the revival of learning he was the most admired of the ancient writers: and the purity and elegance of his style will always place him in the first rank of Roman classics. The life of Cicero was written by Plutarch, and there are modern lives by Middleton, Forsyth, and others. Cicero left a son of the same name by his wife Teren-Young MARCUS was b. in B.C. 65, was tia. carefully educated, and distinguished himself in military service. In B. C. 30 Octavianus (Augustus) assumed him as his colleague in the consulship, and he was afterward governor of Asia or Syria. Cicero had also a daughter, Tullia, who d. in 45 B.C.

Cid, an epithet applied to Ruy or Roderigo Diaz, count of Bivar (1026-1099), the national

hero of Spain. He signalized himself by his exploits in the reigns of Ferdinand, Sancho, and Alphonso VI of Leon and Castile. His life appears to have been entirely spent in flerce warfare with the Moors, then masters of a great part of Spain.

Cl'der, a fermented liquor made from the expressed juice of apples. The apples are ground and crushed until they are reduced to a pulp, the juice is allowed to run into casks, where it is freely exposed to the air until fermentation takes place, when a clear liquor of a pale brown or amber color is the result.

**Cienfuegos** (thē-on-fü-gos), a seaport of Cuba, on the south coast of the island, with a safe and capacious harbor on the Bay of Jagua, 130 mi. s. e. of Havana, with which (and other towns) it is connected by railway. It is among the finest towns of the island, and exports sugar, wax, timber, etc., to the value of over \$5-000,000 annually. Pop. about 16,000.

**Cigar** (si-gür'), a small roll of manufactured tobacco leaves carefully made up, and intended to be smoked by lighting at one end and drawing the smoke through it. The choicest cigars are those made in and imported from Havana. Good cigars are made in the U. S. and elsewhere. Medicated cigars, or cigars made of some substance having remedial properties, are often used for certain complaints, as stramonium cigars for asthma. *Cheroots* are peculiarly shaped cigars much thicker at one end than the other, and are largely imported from Manilla.

Cignani (chē-nyä' nē). CARLO (1628-1719), Italian painter, the last great painter of the Bolognese school. His finest paintings are frescoes in the saloon of the Farnese Palace, Bologna, and in the cupola of the church of the Madonna del Fuoco at Forli. His paintings have been engraved by various artists.

**Cil'ia**, small, generally microscopic, hairlike organs or appendages, found on the surface of the tissues of most animals, and in some vegetable organisms, chiefly on tissues which are in contact with water, or which produce fluid secretions. They are constantly in active movement, and communicate to the fluid with which they are in contact a like motion.

**Cllic'ia**, in ancient geography, the region between Pamphylia and Syria, lying south of Mount Taurus. Alexander made Cilicia a Macedonian province: it then passed to the Syrians. Under Augustus it became an imperial province. It now forms the Turkish' vilayet of Adana.

**Cim'abue**(chē-måbö-ā), GIOVANNI(1240-1302), Italian painter, b. at Florence. Two Greek artists, who were invited to Florence to paint a chapel in the church of Santa Maria Novella, were his first masters. He is considered one of the chief restorers of the art of painting in Italy, which at that time had degenerated into mechanical conventionalism. His best paintings are in the church of Santa Maria Novella at Florence, and in the sacro convento at Assisi. Among his pupils was Giotto, whom he discovered drawing figures on the smooth surface of a rock while tending his sheep.

### Cincinnati

**Cimbri** (sim'bri). a tribe of ancient Europe, the origin of which is involved in obscurity They were regarded as Germans by the Romans, who gave the name of Chersonesus Cimbrica to what is now Julland. Greek writers connected them with the Scythian Cimmerii of the Crimea; while modern writers suppose that they were Celtic, and that Cimbri is the same as the Cymri of Britain. In the second century B. c. they made formidable incursions into Gaul and Spain, but were finally routed by the Consul Marius at Vercelli B. c. 101.

**Cl'mon**, an ancient Athenian general and statesman. He fought against the Persians in the battle of Salamis (480 B.C.), and shared with Aristides the chief command of the fleet sent to Asia to deliver the Greek colonies from the Persian yoke.

**Cinchona** (sin-kō'na or sin-chō'na), an important genus of trees, type of the order Cinchonaceæ, which consists of gamopetalous, calycifloral dicotyledons, sometimes regarded



as a sub-order of Rubiaceæ. They are trees, shrubs, or herbaceous plants, with simple opposite leaves, flowers arranged in panicles or corymbs; calyx adherent, entire or toothed; corolla regular; stamens attached to corolla; ovary two-celled; fruit inferior, dry, or succu-lent. They are found almost exclusively in the tropics, and many of the species are of great medicinal importance as tonics, febrifuges, emetics, and purgatives. From the wasteful method of cutting down the trees to get their bark it was believed that there would soon be a dearth of the valuable medicine, and hence cinchona plants were taken from their native regions and plantations formed in various tropical countries, so that Ceylon, India, Java. etc., are now important sources of Peruvian bark. The bark is taken off in strips longitudinally, and is in time renewed by natural growth.

**Cincinnati**, Hamilton co., O., on north bank of Ohio River, opposite the mouth of the Licking River. It is the largest city in Ohio,

### Cincinnatus

lying in a valley surrounded by hills, forming an amphitheater of great beauty. Railroads: The railroads entering the city number 24, the principal ones being B. & O.; C. Southern; Ohio & Mississippi; C. H. & D.; C. I. St. L. & C.; and C. & Marietta. The first railroad to the city was built in 1842. The Miami and Erie Canal, popularly termed the "Rhine" traverses the city in a southeast direction, and empties by an underground tunnel into the Ohio. Cincinnati is a port of entry and has some foreign commerce. The principal articles of export are whisky, cotton, tobacco, iron and steel. It is a great market for cotton. Principal industries are manufacture of liquor, clothing, meat products, candles, carriages, boots and shoes, furniture and iron. Among the prominent educational institutions are the University of Cincinnati, Wesleyan College, Hebrew College, two Roman Catholic colleges, and Lane Theological Seminary. The place was first settled about 1788 and was incorporated as a city in 1819. Pop. est. 1897, 325,000.

**Cincinna tus**, Lucit's Quintus, a wealthy patrician in the early days of the Roman Republic, b. about 519 B.c. After violently opposing the passage of the Terentilian law for the equalization at law of patricians and plebeians, he succeeded Publicola in the consulship, and then retired to cultivate his small estate beyond the Tiber. Here, when Minucius was surrounded by the Æquians, the messengers of the senate found him at work when

they came to summon him to the dictatorship. He rescued the army from its peril. marched to Rome laden with spoil, and then returned quietly to his farm. At the age of eighty he was again appointed dictator to oppose the ambitious 🖗 designs of Spurius Maelius

Cinera'ria, a genus of plants consisting of herbs or



#### Cineraria.

small shrubs with small-sized heads of yellow flowers. They are chiefly found in South Africa, but a number of varieties have been much cultivated for garden purposes.

**Cinna**, LUCIUS CORNELIUS, an eminent Roman, an adherent of Marius, who, obtaining the consulship B. C. 87, along with Cneius Octavius, impeached Sulla and endeavored to secure the recall of Marius. Being driven from the city by Octavius, he rased the Italian cities, and invested Rome while Marius blockaded it from the sea. On its capture the friends of Sulla were massacred, and Cinna and Marius made themselves consuls (B.C. 86); but after the death of Marius the army refused to follow Cinna against Sulla, and put him to death in B.C. 84.

**Cin'nabar**, red sulphide of mercury, the principal ore from which that metal is obtained, occurring abundantly in California, Spain, China, etc. It is of a cochineal-red color, and is used as a pigment under the name of vermillion. **Cin'namon**,

the bark of the under branches of a species of laurel. which is chiefly found in Ceylon, but grows also in Malabar and other parts of the East Indies. The tree attains the height of 20 or 30 ft., has oval leaves, paleyellow flowers, and. acornshaped fruit. The Ceylonese bark their trees in April



and November, the bark curling up into rolls or quills in the process of drying; the smaller quills being introduced into the larger ones. These are then assorted according to quality by tasters, and made up into bundles. An oil of cinnamon is prepared in Ceylon, but the oil of cassia is generally substituted for it; indeed, the cassia bark is often substituted for cinnamon, to which it has some resemblance. although in its qualities it is much weaker. The leaves, the fruit, and the root of the cinnamon plant all yield oil of considerable value: that from the fruit, being highly fragrant and of thick consistence, was formerly made into candles for the sole use of the king of Ceylon.

**Cin'tra**, a town, Portugal, 15 mi. w.n.w. Lisbon, finely situated on the slope of the Sierra de Cintra, and much resorted to by the wealthier inhabitants of Lisbon. The kings of Portugal have a palace with fine gardens at Cintra. The town is celebrated for the convention entered into there in 1808, by which the French, after their defeat at Vimeira, were conveyed to France. Pop. 4,751.

**Circassi** (or Tcherkessia), a mountainous region in the southeast of European Russia, lying chiefly on the north slope of the Caucasus, partly also on the south, and bounded on the west by the Black Sea, and now forming part of the lieutenancy of the Caucasus. The mountains of which the culminating heights are those of Mount Elbruz, are intersected everywhere with steep ravines and clothed with thick forests, and the territory is prin-

cipally drained by the Kuban and its tributaries. Its inhabitants are divided into several tribes speaking widely different dialects. While they retained their independence their government was of a patriarchal character, but every free Circassian had the right of expressing his opinion in the assemblies. They pos-sessed traditional annals and laws. The duties of hospitality and vengeance were alike binding, and a Spartan morality existed in the matter of theft. Their religion, which is nominally Moslem, is in many cases a jumble of Christian, Jewish, and heathen traditions and ceremonies. As a race the Circassians are comely, the men being prized by the Russians as warriors, and the women by the Turks as mistresses, a position generally desired by the women themselves. Between the tenth and thirteenth centuries it formed a portion of the empire of Georgia, but in 1424 the Circassians were an independent people, and at war with the Tartars of the Crimea, etc., to whose khans, however, some were occasionally trib-ulary. In 1705 the Tartars were defeated in a decisive battle, but shortly after, the territorial encroachment of the Russians on the Caucasian regions began, and in 1829 the country was formally annexed by them. A heroic resistance was made by the Circassians under their leader Schamyl, and on being reduced to submission numbers of the inhabitants emigrated to the Turkish provinces. In the north and east, however, tribes of the Circassian stock remain. The Circassians, properly so called, have been estimated to number from 500,000 to 600,000.

**Circe** (ser-sē), a fabled sorceress of Greek mythology, who lived in the island of Ææa, represented by Homer as having converted the companions of Ulysses into swine after causing them to partake of an enchanted beverage. Ulysses, under the guidance of Hermes, compelled her to restore his companions, and afterward had two sons by her.

Circle is a plane figure contained by one line, which is called the *circumference*, and is such that all straight lines drawn from a certain point (the center) within the figure to the circumference are equal to one another. The properties of the circle are investigated in books on geometry and trigonometry. Properly, the curve belongs to the class of conic sections, and is a curve of the second order. A great circle of a sphere is one that has its center coinciding with that of the sphere. The cele-brated problem of "squaring the circle" is to find a square whose area shall be equal to the area of any given circle. It is not possible to do so. All that can be done is to express approximately the ratio of the length of the circumference of the circle to the diameter, and to deduce the area of the figure from this approximation. If the diameter is called unity, the length of the circumference of the circle is 3.1415926535...; and the area of the circle is found by multiplying this number by the square of the radius. Thus the area of a circle of 2 ft. radius is 3.14159x4, or 12.56636 sq. ft. approximately. For trigonometrical calculations the circumference of the circle is divided into 360 equal parts called degrees, each degree is divided into 60 minutes, and each minute into 60 seconds.

**Circuit Courts**, a term applied distinctively to a class of the Federal courts of the U.S., of which terms are held in two or more places successively in the various circuits into which the country is divided for the purpose.

**Circular Notes,** notes or letters of credit furnished by bankers to persons about to travel abroad. Along with the notes the traveler receives a "letter of indication" bearing the names of certain foreign bankers who will cash such notes on presentation, in which letter the traveler must write his name. On presentation the foreign banker can demand to see the letter of indication, and by causing the presenter to write his name can compare the signature thus made with that in the letter, and so far satisfy himself as to the identity of the person presenting the note.

Circulation, in an organism, the flowing of sap or blood through the veins or channels, by means of which the perpetual and simultaneous movements of composition and decomposition manifested in organic life are carried on. Although Galen, who had observed the opposite directions of the blood in the arteries and veins, may be said to have been upon the very point of discovering the circulation, the discovery was reserved for William Harvey, who in 1628 pointed out the continuity of the con-nections between the heart, arteries, and veins, the reverse directions taken by the blood in the different vessels, the arrangements of values in the heart and veins so that the blood could flow only in one direction, and the necessity of the return of a large proportion of blood to the heart to maintain the In 1661 Malpighi exhibited microsupply. scopically the circulation in the web of a frog's foot, and showed that the blood passed from arteries to veins by capillaries or inter-mediate vessels. This finally established the theory with regard to animals, but the movewith difficulty and after numerous experi-ments. Many physiologists indeed are still disposed to refuse the term "circulation" to this portion of the economy of plants; but though sap, unlike the blood, does not exhibit movements in determinate vessels to and from a common center, a definite course is observable. In the stem of a dicotyledonous tree, for example, the sap describes a sort of circle, passing upward from the roots through the newer woody tissue to the leaves, where it is elaborated under the action of air and light; and thence descending through the bark toward the root, where what remains of it is either excreted or mixed with the new fluid, entering from the soil for a new period of In infusorial animalcules the circulation. movement of the fluids of the body is maintained by that of the animal itself and by the disturbing influence of nutritive absorption. In the Collenterata the movement receives aid besides from the action of cilia on the inner

# Circumnavigators

walls of the body. The Annelids, as the earthworm, possess contractile vessels traversing the length of the body. The insects, crusta-ceans, Myriapods, and spiders have a dorsal tube, a portion of which may be specially de-veloped as a heart. The blood is driven to the tissues, in some cases along arterial trunks, being distributed not in special vessels, but simply through the interstices of the tissues. From the tissues it is conveyed, it may be by special venous trunks, to a venous sinus which surrounds the heart and opens it by valvular apertures. The Mollusca have the heart provided with an auricle and a ventricle, as in the snail and whelk; two auricles, one on either side of the ventricle, as in the fresh-water mussel: or two auricles and two ventricles, as in the ark-shells. Among the ascidians, which stand low in that division of animals to which the molluscs belong, the remarkable phenomenon is encountered of an alternating current, which is rhythmically propelled for equal periods in opposite directions. All vertebrated animals have a heart, which in most fishes consists of an auricle and ventricle, but in the mudfishes there are two auricles and one ventricle; and this trilocular heart is found in the amphibians, and in most reptiles except the crocodiles, which, like birds and mammals, have a four-chambered organ consisting of two auricles and two ventricles. In these two last-named classes the venous and arterial blood are kept apart; in the trilocular hearts the two currents are mixed in the ventricle.

Circumnav'igators, a term usually applied to the early navigators who sailed the globe. Magellan, a Portuguese in the service of Spain, headed the first expedition which succeeded in circumnavigating the globe, though he did not live to complete the voyage. He sailed with five ships from San Lucar, Sept. 20, 1519, passed the straits named after him in November, 1520, and was killed in the Philippine Islands in April, 1521, Juan Sebastian del Cano continuing the voyage and reaching San Lucar with the only remaining ship in September, 1522. The principal early navigators, after Magellan, who succeeded in making the voyage round the globe were Grijalva and Alvaradi (Spaniards), 1537; Mendana (Spanish), 1567; Drake (English), 1577-80; Cavendish. 1580-88; Le Maire (Dutch), 1615-17; Quiros (Spanish), 1625; Tasman (Dutch), 1642; Cowley, 1683; Dampier, 1689; Cooke, 1708; Clipperton, 1719; Roggewein (Dutch), 1721-23; Anson, 1740-44; Byron, -1764-66; Wallis, 1766-68; Carteret, 1766-60; Bougainville, 1766-69; Cook, 1768-71; and Portlocke, 1788.

**Cir'cus**, among the Romans, a nearly oblong building without a roof, in which public chariot-races and exhibitions of pugilism and wrestling, etc., took place. It was rectangular, except that one short side formed a half-circle; and on both sides, and on the semicircular end, were the seats of the spectators, rising gradually one above another, like steps. On the outside the circus was surrounded with colonnades, galleries, shops, and public places. The largest of these buildings in Rome was

the Circus Maximus, capable, according to Pliny, of containing 260,000, and according to Aurelius Victor, 385,000 spectators. At present, however, but few vestiges of it remain, and the circus of Caracalla is in the best preservation. The games celebrated in these structures were known collectively by the name of ludi circenses, circensian games, or games of the circus, which under the emperors attained the greatest magnificence. The principal games of the circus were the Roman or Great Games which were celebrated from September 4-14, in honor of the great gods, so called. The passion of the common or poorer class of people for these shows appears from the cry with which they addressed their rulers: "Bread and the games!" The festival was opened by a splendid procession, or pompa, in which the magistrates, senate, priests, augurs, vestal virgins, and athletea, took part, carrying with them the images of the great gods, the Sibylline books, and sometimes the spoils of war. On reaching the circus the procession went round once in a circle, the sacrifices were performed. the spectators took their places, and the games These were: 1, Races with commenced. horses and chariots, in which men of the high-est rank engaged. 2, The gymnastic contests. 3, The Trojan games, prize contests on horseback, revived by Julius Cæsar. 4. The combats with wild beasts, in which beasts fought with beasts or with men, criminals or volunteers. 5, Representations of naval engagements, for which purpose the circus could be laid under water. The expense of these games was often immense. Pompey, in his second consulship, brought forward 500 lions at one combat of wild beasts, which, with eighteen elephants, were slain in five days.

The modern circus is a place where horses are trained to perform antics, and where exhibitions of acrobats and various pageantries, including a large amount of buffoonery, are represented.

**Cisalpine Republic**, a state set up in 1797 by Napoleon I in North Italy, recognized by Germany as an independent power at the Peace of Campo-Formio. It comprised Austrian Lombardy, together with the Mantuan and the Venetian provinces, Bergamo, Brescia. Crema, Verona, and Rovigo, the duchy of Modena, the principality of Massa and Carrara, Bologna, Ferrara, and Romagna, and latterly its area was 16.337 sq. mi.; its pop. 3,500,000. The legislative body held its sessions in Milan. On Jan. 25, 1802, it received the name of the *Italian Republic*; from 1805 to 1814 it formed part of the kingdom of Italy; and it was given to Austria by the Congress of Vienna in 1815 as the Lombardo-Venetian kingdom.

**Cithæ'ron** (the modern Elatéa), a mountain of Greece, which, stretching northwest, separates Bœotia from Megaris and Attica. Its loftiest summit is 4,620 ft. in height.

Cities of Refuge, six out of the forty-eight cities given to the tribe of Levi in the division of Canaan, set apart by the law of Moses as places of refuge for the manslayer or accidental homicide. Their names were Kedesh.

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Shechem, and Hebron on the west side of Jordan; and Bezer, Ramoth-Gilead, and Golan on the east.

**Citric Acid**, the acid of lemons, limes, and other fruits. It is generally prepared from lemon-juice, and when pure is white, inodorous, and extremely sharp in its taste. In combination with metals it forms crystalline salts known as citrates. The acid is used as a discharge in calico printing and as a substitute for lemon in making beverages.

**Cit'ron**, a small evergreen shrub yielding a fruit which is candied with sugar. The rind is



a.-fruit; b.-transverse section of fruit.

considered superior to the pulp; it is imported in a preserved state, and is used in confectionery.

**Cit' rus**, an important genus of trees, nat. order Aurantiacæ, or that of the orange, characterized by simple ovate acuminate leaves or leaffets united by a distinct joint to the leaflike stalk; by having the stamens united by their filaments into several irregular bundles, and by yielding a pulpy fruit with a spongy rind. *Citrus Medica* is the citron. Other species are the lemon, the sweet orange, the shaddock, and the forbidden fruit, sometimes used as an ornamental addition to dessert. The genus *Citrus* furnishes the essential oils of orange and lemon peels, of orange flowers, of citron peel, of bergamot, and oil of orange leaves—all much esteemed in perfumery.

City, in a general sense, a town holding, from extent of population, favorable situation, or other causes, a leading place in the community in which it is situated. Popularly, also, it is used, both in Britain and in France, to designate the old and central nucleus as distinguished from the suburban growths of large towns. The ecclesiastical sense of the term city is a town which is, or has been, the see of a bishop. This seems to be the historical use of the term in England, and still possesses some authority there, but to a considerable extent it has been superseded by the wider one. In America the application of the term is dependent upon the nature and extent of the

# Civilization

municipal privileges possessed by corporations and a town is raised to the dignity of a city by special charter. Generally the term implies the existence of a mayor at the head of the municipality.

**Ciudad-Real** (thi- $\ddot{o}$ - $d\ddot{a}d$ - $r\ddot{a}$ - $\dot{a}l'$ ) ("royal town") a town of Spain, capital of the province of same name, on a low plain near the Guadiana, 100 mi. s. of Madrid. The principal edifice is the church of Santa Maria, a magnificent structure, though consisting only of a single nave. Pop. 13.801. The province occupies the south extremity of New Castile, between the parallel ranges of the Sierra Toledo and Sierra Morena. Area 7,940 sq. mi.; pop. 280,-075.

**Ciudad-Rodrigo** (thi- $\ddot{o}$ -d $\ddot{a}$ d-rod-r $\ddot{e}$ 'g $\ddot{o}$ ) ("Roderick town"), a fortress in Spain, in Leon, on the river Aguada, was a place of considerable importance in the early Spanish history as a fortress on the Portuguese frontier, and was of some importance in the Peninsular War, being taken by storm by the British under Wellington, after a siege of eleven days. The Cortes gave Wellington the title of Duke of Ciudad-Rodrigo,

**Civ** et, a genus of carnivorous mammals found in North Africa, and in Asia from Arabia to Malabar and Java, and distinguished by having a secretory apparatus in which collects the odoriferous faity substance known as *ciret*. The animal, which in form is intermediate between the weasel and the fox, and from 2 to 3 ft. long by 10 in. high, is of a cinereous color, tinged with yellow and marked



Civet.

by dusky spots disposed in rows. They are nocturnal, and prey upon birds and small animals, and may be considered as forming the transition from the musteline or marten kind to the feline race.

**Civiliza** tion, the sum at any given time of the attainments and tendencies by which the human race or any section of it is removed from the savage state. The history of progress in civilization is usually presented from one of two points of view—the first conceiving the race as starting from a high civilization, to which in point of intellectual and moral power it has yet to return; the second viewing the



civilization of any period as the result of a constant and increasingly successful stream of effort upward from an origin comparable with the condition of the lower animals. The latter is the prevailing scientific theory, which finds the secret of progress in the interaction of function and environment. According to it primitive man, at first feeding on wild fruits and berries, and sheltering himself under overhanging rocks or caves, entered upon the stone age, in which, as the contemporary of the mammoth and cave bear, he made himself sharp-edged tools by chipping the flakes of flint found in the drift under gravel and clay. In the newer stone age he learned the art of polishing these rough implements, with which he cut down trees to make cances, killed wild animals for food, and broke their bones for marrow, or shaped them into weapons. Fire he turned to account to hollow out trees, to cook his food, to fashion clay ware. Artificial means of shelter were constructed by piling rude huts of stones, by digging holes in the ground, or by driving piles into the beds of The lakes and raising dwellings on them. artistic instincts found expression in drawings of animals scratched upon bone or slate. The discovery of metals constituted a great step in advance. Gold and copper came early into use, and bronze was soon discovered, though a long time passed before iron was smelted and substituted for bronze where hardness was required. Gradually the roving savage became a nomadic shepherd and herdsman, or a tiller of the soil, according to his environment. The practise of barter was in part superseded by the beginnings of some sort of currency. Gesture language gave place in part to an enlarged vocabulary, and picture writing to the use of phonetic signs. In the meantime man had begun to question himself and the world on profounder issues, entering upon the mythmaking age, in which was projected outward on the chief phenomena of nature some shadow of his own personality. The worship of the sun, moon, and stars, a faith in a future life, the worship of dead ancestors, fetiches, animals, etc., the belief in magic and witchcraft, all sprang into being. Prayer came spontaneously to him: the idea of propitiation by sacrifice would arise from his dealings with his fellows and his foes; the sacred books began to shape themselves. Tribal and national relations, arising from ties of family and exigen-cies of defense, were cemented by unity of faith, and the higher social unit began to perfect itself under the rule of the patriarch, the bravest warrior, etc. With varying needs, arising from diversity of environment, dis-tinctions of nationality became more and more emphatic, and the history of civilization becomes the history of the nations viewed from the philosophic standpoint.

**Civil Law**, among the Romans the term nearly corresponding to what in modern times is implied by the phrase *positive law*, that is, the rules of right established by any government. They contradistinguished it from natural law (*jus naturāle*), by which they meant a

certain natural order followed by all living beings; also from the general laws of mankind established by the agreement of all nations and governments (*jus gentium*). With the growth and multiplication of the edicts issued by the prætors (in whose hands was the supreme administration of justice) for the modification and extension of the positive enactments a further distinction became necessary, the whole prætorian law being known by the name of jus honorarium as opposed to the strict formal law (jus civile). The latter, however, included both the private law (jus privatum), which relates to the various legal relations of the different members of the state the citizens - and the public law (jus publicum), that is, the rules respecting the limits, rights, obligations, etc., of the public authori-ties. The final digest of Roman law was made in the sixth century A. D. under the Emperor Justinian, but at first was only admitted as formally binding in a small part of Italy. After the eleventh century, in Upper Italy, particularly in the school of Bologna, the body of the Roman law, put together by Justinian, was formed by degrees into a system applicable to the wants of all nations; and on this model the ecclesiastical and papal decrees were arranged and to a considerable degree the native laws of the new Teutonic states. From all these the Roman law was distinguished under the name of civil law. In this sense, therefore, civil law means ancient Roman law; and it is contradistinguished from canon law and feudal law, though the feudal codes of the Lombards have been received into the corpus juris civilis or body of civil law. As the Roman code exerted the greatest influence on modern Europe, the expression civil law is also used to embrace all the rules relating to the private rights of citizens. Under the term civil law, therefore, in America and Europe, is to be understood not only the Roman law, but also the modern private law of the various countries; for example, in Germany, Das ge-meine Deutsche Privatrecht; in France, the Code civil des Français or Code Napoléon. In this sense it is chiefly opposed to criminal law, particularly in reference to the administration of justice, which is to be divided into ciril justice and criminal justice.

Civil Service .--- Under this head are classed all officers who do not belong to the military or naval service, but are engaged in the administration of the civil affairs of the state, such as the collection of revenue, performance of executive duties of the government, and representation of the country abroad. Originally the civil service was a body small in number. but the number of persons employed under the government has vastly increased and new departments have been organized to carry out the laws of the states. It will readily be seen that the administration of such affairs calls for unbiased action and it should be done independent of any party. Its success, in fact, depends upon its being done wholly on business principles. General Jackson's statement that "to the victors belong the spoils" has

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been, to a great extent, set aside in the civil service of the U.S. In the first year of his presidency 490 postmasters and 240 officials were removed.

Henry Clay wrote: "Among the official corps there is the greatest solicitude. The members of it feel something like the inhabitants of Cairo when the plague strikes it. No one knows who is next to encounter the stroke of death or, which with many of them is the same thing, to be dismissed from office."

In 1840 Horace Greeley wrote from Washington: "We have nothing new here in politics, but large and numerous swarms of office-hunting locusts sweeping into Washington daily: all the rotten land speculators, broken bank directors, swindling cashiers, etc., are in full cry for office, office; and even so humble a man as I am is run down by letters, letters."

General Grant, in 1872, undertook to suppress the evil of office seeking, and appointed a commission to make rules and regulations for admission to and continuance in the civil service. The rules reported, however, by this commission were never carried out to any considerable extent on account of the political pressure which was brought to bear on the members of Congress. President Hayes un-dertook to carry out Grant's plan, and a reform was noticed in several of the large post offices of the country. In January, 1883, Congress passed a law to prevent the abuse of the appointing power of the officers of the government. The president was authorized to appoint, with the advice and consent of the Senate, three civil service commissioners whose duty is to aid the president in preparing suit-able rules which shall provide for open, com-petitive examinations, for testing the fitness of applicants for the public service, such examinations to be practical in their character, and so far as may be relating to those matters which will fairly test the relative capacity and fitness of the person examined, to discharge the duties of the service. All the of-fices, places, and employments ranged in classes or grades, are to be filled by selection according to grade from among those graded highest as the result of such competitive examination. Appointments to the public service in the departments at Washington are to be proportioned upon the basis of population to the several states. The law provides that all persons in the public service shall be exempted from any obligation to contribute to any political fund, or to render any political service. It forbids any person in the public service using his official authority to coerce the political action of any other person or body. Non-competitive examinations in all proper cases are provided for, after notice given of a vacancy. The appointing power should give notice in writing to the civil service commission, of the persons selected for appointment among those who have been examined. Power is given this commission to make regulations for, and have control of, such examinations subject to the rules made by the president. Provision is made for holding examinations at convenient places in every state and territory of the U.S. The commission punishes by fine and imprisonment all in the public service who willfully defeat, obstruct, or deceive any person in respect to his right of examination, or who shall corruptly or falsely mark, grade, estimate, or report upon the proper standing of any person examined, or aid in so doing, or who shall furnish to any person any special or secret information for the purpose of either improving or injuring the prospects of any person so examined being appointed, employed, or promoted. It further provides that no person in the habit of using intoxicating liquors is to be appointed to or retained in offices to which the act applies. Since the passage of this act, the system of competitive examinations has been extended, not only of the federal offices but also to the civil service in several of the states and the large cities.

Rules for federal appointments include the following:---

Applicants. — Applicants for examination must be citizens of the U. S., of the proper age. No discrimination is made on account of sex, color, or political or religious opinions. The limitations of age vary with the different services; but the age limitations do not apply to any person honorably discharged from the military or naval service of the U.S. by reason of disability resulting from wounds or sickness incurred in the line of duty. Everyone seek-ing to be examined must file an application blank. The blank for the Departmental, Railway Mail, Indian School, or Government Printing Office Service should be requested directly of the Civil Service Commission at Washington. The blank for the Customs, Postal, or Internal Revenue Service must be requested in writing by the persons desiring examination of the Customs, Postal, or Internal Revenue Board of Examiners at the office where service is sought. The service classified under the act, and to which it and the rules apply, embraces the employees in the Executive Departments at Washington, the employees at the Executive Mansion, and the employees at the Civil Service Commission, the Department of Labor, the Commission of Fish and Fisheries, the Interstate Commerce Commission, under the Superintendent of the State, War, and Navy Building, the Smithsonian Institution, the Library of Congress, and the Government Printing Office, the employees in the Weather Bureau, and all officers and employees of whatever designation, except persons merely employed as laborers or workmen, and persons whose appointments are subject to confirmation by the senate, however or for whatever purpose employed, whether compensated by a fixed salary, or otherwise, who are serving in. or on detail from, the several Executive Departments, the Commissions and offices in the District of Columbia, the Railway Mail Service, the Indian Service, the several Pension Agencies, the Steamboat Inspection Service. the Marine Hospital Service, the Light House Service, the Life Saving Service, the several

mints and assay offices, the Revenue Cutter Service, the force employed under custodians of public buildings, the several sub-treasuries, the Engineer Department at large, and the Ordnance Department at large, all executive officers and employees outside the District of Columbia of whatever designation, except persons merely employed as laborers or workmen, and persons whose appointments are subject to confirmation by the senate, whether compensated by a fixed salary, or otherwise, who are serving in a clerical capacity, or whose duties are in whole or in part of a clerical nature; who are serving in the capacity of watchman or messenger; who are serving in the capacity of physician, hospital steward, nurse, or whose duties are of a medical nature: who are serving in the capacity of draughtsman, civil engineer, steam engineer, electrical engineer, computer or fireman; who are in the service of the supervising architect's office in the capacity of superintendent of construction, superintendent of repair, or foreman; who are in the service of the Treasury Department, in any capacity; and who are employed in the Department of Justice under the annual appropriation for the investigation of official acts, records, and accounts of officers of the courts; all free delivery post offices, the Indian school, and agency service, the customs districts in each of which there are five or more employees, and the Internal Revenue service at large.

The applicants to enter the service designated are examined as to their relative capacity and fitness. The ordinary clerical ex-aminations are used only in the Customs, De-partmental, the Internal Revenue services for clerkships requiring no particular information or skill. They are limited to the following subjects: First, orthography, penmanship, and copying; second, arithmetic, fundamental rules, fractions, and percentage; third, interest and discount, elements of bookkeeping, and accounts; fourth, elements of the English language, letter writing, and the proper construc-tion of sentences. For places in which a lower degree of education suffices, as for employees in post offices, compositors, and other trade employees, and those below the grade of clerks in customhouses, and in the Departments at Washington, the Commission limits the examination to less than these four subjects, omitting the third and parts of the fourth subject. The examinations relate as nearly as possible to the duties to be performed, and wherever applicable include experience and practical No one is certified for appointment tests. whose standing in the examination is less than 70 per cent. of complete proficiency, except that applicants claiming military or naval preference need obtain but 65 per cent. The law also prescribes competitive examinations to test the fitness of persons in the service for promotion therein. The Commission gives a certificate to the person examined, stating whether he passed or failed to pass.

Civil Service in Cities.—Civil service in the large cities is now, to a considerable extent,

under civil service laws. The most marked effect of the civil service laws in the cities has been to relieve the mayors and heads of departments from the pressure of applicants for office, thus leaving them free to attend to their more important public duties. It has also relieved city employees from the unfair burden of political assessment. No officer or employee can solicit or receive pay or be in any manner concerned in soliciting, receiving, or paying any assessment, subscription, or contribution for any party or political purpose whatever. Applications for admission to examination are made on blanks in a definite form and manner, and supported by such certificates of persons acquainted with the applicant as may be prescribed. Blanks for such applications are furnished by the civil service commission.

Every applicant must be a citizen of the U. S. and of good moral character, sound health, and physically able to perform the duties of the office applied for. The exami-nations are absolutely impartial, practical in their character, and intended to fairly test the relative capacity and fitness of the persons examined for the service which they seek to enter. No questions relating to political or religious opinions or affiliations are asked. Applicants must average not less than 70 per cent. of complete proficiency in the subjects of the examination. Physical examinations are made to determine the physical qualifications and health of the applicant, and each applicant is notified of the general average he has obtained, and any person who has failed to pass the examination cannot be re-examined within six months from date of his failure. All competitors who attain a general average of 70 per cent. or over, are eligible for ap-pointment, and their names are enrolled in the order of general average upon proper registers. The names remain upon the register of eligibles for two years from date of enrollment. Any person whose name is on the register of eligibles may accept temporary appointment without losing his position on the register of eligibles. All promotion in the civil service, unless otherwise provided, is from grade to grade, and is made upon voluntary, open, competitive examinations.

The official service is divided into medical; civil engineers; clerical service, embracing copyists, clerks, pages, messengers, recorders, bookkeepers, stenographers, ti me ke ep ers, weighers, etc.; police service; electrical service; fire service; mechanical engineers; bridge employees; inspectors; janitors; elevator conductors; library service, etc. For examination in the medical service, applicants for position must be regular graduates of some reputable medical college, and have been actively engaged in the practise of medicine. In the clerical service, applicants for places are usually examined in handwriting, spelling, copying, fundamental rules of arithmetic, fractions, percentage, copying from rough draft, clear and correct statement, letter writing, etc. For police service applicants must

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pass the physical test and examination in handwriting, spelling, copying, etc.

**Civita Vecchia** (chē-vē-tä-vek'i-a), one of the best seaports of Central Italy, lying in a barren and unhealthy district, 38 mi. n. w. Rome. It is a fortified naval port, and has an arsenal, shipyards, cathedral, etc. Pop. 11,330.

**Clackman** nan, the smallest county of Scotland, containing little more than 47 sq. mi.

Claiborne, WILLIAM (1589-1676), a famous colonist. He was appointed, under the London Company, surveyor of the Virginia plantations. He arrived in Jamestown, and located in James City in October, 1621. Soon afterward he acquired an estate amounting to 45,000 acres. In 1625 he became secretary of state for the colony, and in 1628 was commissioned to make discoveries southward, and open trade with the Indians. He settled the Isle of Kent, and established a trading post, bought out the interest of the natives in that island, and induced many settlers to locate on his lands. When Lord Baltimore's first colony arrived at St. Marie's, in March, 1634, they claimed con-trol over the Isle of Kent. The dispute was continued for many years, until Virginia, in 1776, released all claims to the territory of Maryland beyond the Potomac River. When Lord Baltimore's colony had been founded on St. Mary's River, trouble began between them and the party of Claiborne, and in course of time the latter's settlement on the Isle of Kent became a failure. Claiborne had become involved in serious difficulties, and in 1637 sailed for England. He bought Palmer's Island from the Indians, but was unable to maintain his right thereto. Claiborne was made treasurer of the colony of Virginia for life by King Charles I. on April 6, 1642. When the Cromwellian revolution began to make headway in Great Britain, Claiborne saw fit to join the Parliamentary party, and in 1651 was appointed a commissioner by Parliament to reduce Virginia and the plantations on Chesapeake Bay. An English expedition arrived in Virginia in 1652 and established a Roundhead government with Claiborne as secretary of state.

**Claiborne**, WILLIAM CHARLES COLE (1775-1817), governor of Louisiana. He was a member of the convention which prepared the state constitution of 1796, and in 1797 was elected to Congress, where he served two terms. In 1802 he was appointed governor of the territory of Mississippi, and in 1803, when Louisiana was bought from the French, he was appointed a commissioner with Gen. James Wilkinson to take possession of the new territory, of which he was made governor in 1804. When Louisiana was made a state in 1812, he was elected governor. In 1816 he was elected to the U.S. Senate but was prevented by impaired health from taking his seat.

**Clairvoyance** (that is "clear-seeing"), an alleged faculty by which certain persons in certain states, or under certain conditions, are said to be able to see things by some sort of mental or spiritual vision apart altogether from the sense of sight. It is claimed that clairvoyance is the result of a kind of natural state of trance, or may be induced by mesmerism: and in evidence of its existence in ancient times, the utterances of prophets, sibyls, etc., have been adduced.

**Clam**, the popular name of certain bivalvular shellfish of various genera and species, e.g., the thorny clam, the yellow clam, the giant clam, the common clam of America, etc. The giant clam has the largest shell known, and the animal is used as food in the Pacific. The clam is a justly-esteemed table delicacy.

Clan, among the Highlanders of Scotland, consisted of the common descendants of the, same progenitor, under the patriarchal con-trol of a chief, who represented the common ancestor. The name of the clan was frequently formed of that of the original progenitor with the affix mac (son): thus the Mac-Donalds were the sons of Donald, and every individual of this name was considered a descendant of the founder of the clan, and a brother of every one of its members. The chief exercised his authority by right of primogeniture, as the father of his clan; the clansmen revered and served the chief with the blind devotion of children. The clans each occupied a certain portion of the country, and hostilities with neighboring clans were extremely common. Next in rank to the chief were a certain number of persons, commonly near relations of the chief, to whom portions of land were assigned, during pleasure or on short leases. Each of these usually had a subdivision of the clan under him, of which he was chieftain, subject, however, to the general head of the sept. The jurisdiction of the chiefs was not very accurately defined, and it was necessary to consult, in some measure, the opinions of the most influential clansmen and the general wishes of the whole body. It was latterly the policy of the government in Scotland to oblige the clans to find a representative of rank to become security at court for their good behavior; the clans who could not procure a suitable representative, or who were unwilling to do so, were called broken clans, and existed in a sort of outlawry. Few traces of this institution now remain, except such as have a merely sentimental character; thus all those who possess the same clan name may still talk of their "chief," though the latter have now neither land nor influence.

**Clap' ham**, a southern suburban district of London. Clapham Common is a fine open space of over 200 acres. Pop. 96,952.

**Clap Net**, a ground-net used by bird catchers, consisting of two equal parts about 12 yards long by 24 wide, and each having a slight frame. They are placed about four yards apart, and are pulled over by a string so as to enclose any birds on the intervening space.

**Clap' perton**, HUGH (1788-1827), African traveler, b. in Annan, Dumfriesshire. He became a lieutenant in the army in 1816. He then accompanied Doctor Oudney and Lieutenant Denham to Africa, where he remained till 1825. On his return to England Clapperton received the rank of captain, and immediately engaged in a second expedition. to start from the Bight of Benin. Leaving Badagry, December, 1825, he penetrated to Katunga, within thirty miles of the Quorra or Niger, but was not permitted to visit it. At Soccatoo the Sultan Bello refused to allow him to proceed to Bornu, and detained him a long time in his capital. The disappointment preyed upon him, and he died, at Chungary, a village near Soccatoo. He was the first European who traversed the whole of Central Africa from the Bight of Benin to the Mediterranean.

**Clare**, a maritime county, Ireland, province Munster (capital, Ennis), between Galway Bay and the Shannon estuary; area 827,994 acres. Oats, potatoes, wheat, and barley are the principal crops. The chief minerals are limestone, lead, and slate, but the produce of the county is almost wholly agricultural. The salmon fisheries are valuable, and there are immense oyster beds in some places. Pop. 123,859.

**Clare Island,** an island of Ireland, county Mayo. It has a lofty lighthouse.

**Claremont,** Sullivan co., N. H., 48 mi. w. by n. of Concord. It is on the Concord & Claremont R. R., and near the Vermont Central. There is abundant water power which runs several paper, cotton, and woolen mills, forming the principal industries, Printing and bookbinding are also carried on to a considerable extent. The town was settled in 1762. Pop. est. 1897, about 5,000.

Clar'ence, GEORGE, DUKE OF, son of Richard, duke of York, and brother of Edward IV, king of England. On his brother's accession, in 1461, he was created duke of Clarence, and in 1462 lord-lieutenant of Ireland, but afterward joined the disaffected Warwick and married his daughter. On the eve of battle he rejoined his brother, and was afterward involved in a quarrel with his brother Richard, who had married Warwick's younger daughter, about the inheritance of their father-in-law. On the death of his wife Clarence sought the hand of Mary of Burgundy, but Edward interposed and a serious breach ensued. A gentleman of the household of Clarence having at this time been condemned for using necromancy against the king, Clarence interfered with the execution of the sentence. He was impeached by the king in person, condemned in 1478, and The secretly made away with in the tower. tradition that he was drowned in a butt of malmsey wine is unsupported by evidence.

**Clar'endon**, CONSTITUTIONS OF, a code of laws adopted in the tenth year of Henry II (January, 1164), at a council of prelates and barons held at the village of Clarendon, Wiltshire. These laws, which were finally digested into sixteen articles, were brought forward by the king as "the ancient customs of the realm," and were enacted as such by the council, but they really involved a great scheme of administrative reform in the assertion of the supremacy of the state over clergy and laity alike. The power of the ecclesiastical courts was restricted, the crown secured the right of interference in elections to ecclesiastical offices, appeals to Rome were made dependent on the king's leave. ecclesiastical dignitaries were deprived of their freedom to leave the country without the royal permission, etc.

Clar'endon, Edward Hyde, Earl of (1608-1674), lord high-chancellor of England, son of a private gentleman of Dinton, Wilts, where he was b. He commenced his political career in 1640 as member for Wootton Basset, and was again returned to the Long Parliament (November, 1640) by the borough of Saltash, at first acting with the more moderate of the popular party, but gradually separating himself from the democratic movement until, by the autumn of 1641, he was recognized as the real leader of the king's party in the House. Upon the breaking out of the civil war he joined the king at York, was knighted, made privy councilor, and appointed chancellor of the exchequer. In September, 1649, he joined Charles at The Hague, and was sent by him on an embassy to Madrid. Soon after his return he resumed the business of the exiled court. After Cromwell's death he contributed more than any other man to promote the Restoration, when he was placed at the head of the English administration. In 1660 he was elected chancellor of the University of Oxford, and in 1661 was created Baron Hyde, Viscount Corn-bury, and earl of Clarendon. The marriage of the Duke of York with his daughter, Anne Hyde, confirmed for a time his power, but in 1663 Lord Bristol made an unsuccessful attempt to impeach him, his influence with the king declined, and his station as prime minister made the nation regard him as answerable for the ill success of the war against Holland. the sale of Dunkirk, etc. The king's displeasure deepened when his plan of repudiating his wife and marrying the beautiful Lady Stuart was defeated by Clarendon, who effected a marriage between this lady and the Duke of Richmond. The king deprived him of his offices, an impeachment for high treason was commenced against him, and he was compelled to seek refuge in Calais. He lived six years at Montpellier, Moulins, and Rouen. where he d. His remains were afterward removed to Westminster Abbey.

**Clarifica' tion**, or the separation of the insoluble particles that prevent a liquid from being transparent, may be performed by *depuration*, in which the liquid is allowed to stand until the particles are precipitated, and then decanted; by *filtration*, or straining through wood, sand, charcoal, etc.: or by *congulation*, in which the albumen contained in or added to the liquid is solidified and precipitated by the action either of heat or of acids, the extrancous substances being precipitated with it.

**Clarinet** (or clarionet), a wind instrument of the reed kind, played by holes and keys. Its lowest note is E below the F clef, from which it is capable, in the hands of good performers, of ascending more than three octaves. The keys of C and F, however, are those in which it is heard to most advantage, though there are B flat, A, D, B, and G clarinets.

**Clark**, ALVIN (1804-1887), b. in Ashfield. Mass. He and his son, Alvin Graham Clark.

became the leading manufacturers of object glasses for telescopes, and made the 36-inch refractor for the Lick observatory

Clark, ALVIN GRAHAM (1832-1897), was b. in Fall River, Mass. He was the son of Alvin Clark, and a descendant of Thomas Clark, who was one of the Pilgrims. He was educated in the public schools at Cambridge, and afterward learned the trade of a machinist. He subsequently worked with his brother George at lens making in East Cambridge, and became a member of the firm of Alvin Clark & Sons, telescope-makers, in 1852. Continuing in the work of making telescopes after the death of his father and brother, and retaining the firm name, he completed the celebrated 36-inch Lick telescope in 1887 and the Yerkes lens of 40 inches aperture for the University of Chicago. In addition to his work as manufacturer of telescopes he was also a practi-

cal astronomer, and as a result Clarinet. of his independent astronomical observation, discovered fourteen intricate double stars, among them the companion of Sirius, for which discovery the Lalande gold medal for 1862 was awarded him by the French Imperial Academy of Sciences.

moved; b.-the same with reed attached.

a.-

mouthplece.

back view, with reed re-

Clark, George Rogers (1752-1818), American He began life as a land surveyor, and pioneer. commanded a company of militia in Lord Dunmore's war with the Indians. In 1772 he commanded a force of armed settlers in Kentucky. In December, 1877, Major Clark obtained permission and means from Virginia to attack the fort at Kaskaskia, which he captured on July 4, 1778. To retaliate an invasion of Kentucky by 600 Canadians and Indians, he destroyed an Indian town in Ohio in 1780. In the same year he went to Richmond to obtain approval from the authorities for his plans for the capture of Detroit, and while there took a command under Baron Steuben to defend Virginia against an invasion by a British force. In 1781 Clark became brigadier general. In 1782 he gathered a large force and marched against Indian towns on the Miami and Scioto, five of which were destroyed. About 1794 he accepted a commission as major general in the French army, to conduct an expedition against the Spanish possessions on the Mississippi, but when the French minister to the U.S., who gave him the commission, was recalled, this was annulled. General Clark's latter years were spent in poverty

Clark, JAMES (1788-1870). a noted British physician. For many years he was physician in ordinary to Queén Victoria, by whom he was created a baronet. His chief works were trea-

# Claudlus

tises on the Sanative Influence of Climate, and on Pulmonary Consumption and Scrofula.

Clarke, CHARLES COWDEN (1737-1877), Eng-lish writer. He was one of the minor members of the Shelley, Keats, and Leigh Hunt group. His publications include his Hundred Wonders, Adam the Gardener, Shakespeare Char-acters, and Molière Characters. He is best known, however, by the edition of Shakespeare which he annotated in conjuction with his wife, and by the Shakespeare Key.

Clarke, JAMES FREEMAN (1810-1888), American clergyman, b. in Hanover, N. H. After graduation at Harvard in 1829, and at the Cambridge divinity school in 1833, he became pastor of the Unitarian church in Louisville, Ky. serving from 1833 till 1840. From 1836 till 1839 he was editor of the Western Messenger, pub-lished in Louisville. Returning to Boston he founded in 1841, the Church of the Disciples, of which he was the pastor until 1886. This became one of the leading religious institutions of Boston. From 1867 till 1871 he was professor of natural religion and Christian doctrine in Harvard, and in 1876-7, lecturer there on ethnic religions. He was an overseer of Harvard, a member of the state board of education, and a trustee of the Boston public library. He was the author of several historical works and theological essays. He d. at Jamaica Plain, Mass.

Clarke, JOHN S., actor, b. in Maryland in 1835; began his theatrical career in 1852 in Philadelphia, and was speedily recognized as the best exponent of low comedy then on the boards. He starred the country for years, owned and managed theaters in Philadelphia and Boston, and from 1867 to 1870 played in England with great success.

Clarke's River, a river of the U.S., rising in the Rocky Mountains, and after a winding n.w. course of about 700 mi., falling into the Columbia, in Washington.

**Clarksville**, Montgomery co., Tenn., on Cumberland River, 60 mi. below Nashville. Railroad, Louisville & Nashville. It is the center of a productive tobacco-growing trade. with a very extensive trade in leaf and man-ufactured tobacco. The tobacco exchange handles about 100,000,000 pounds annually. Pop. est. 1897, over 8,000.

Claude Lorraine (1600-1682), a landscape When twelve years old he went to painter. live with his brother, an engraver in wood at Friburg, went from him to study under Godfrey Waats at Naples, and was afterward employed at Rome by the painter Agostino Tassi, to grind his colors and do the household On leaving Tassi he traveled in drudgery. Italy, France, and Germany, but settled in 1627 in Rome, where his works were greatly sought for, and where he lived much at his ease until his death. The principal galleries of Italy, France, England, Spain, and Ger-many are adorned with his paintings.

Clau' dius, (or, in full, TIBERIUS CLAUDIUS DRUSUS NERO GERMANICUS) (B. C. 10-A. D. 54), a Roman Emperor, son of Claudius Drusus Nero, stepson of Augustus and Antonia, the





daughter of Augustus's sister. He lived in privacy, occupying himself with literature, the composition of a Roman history, and other works, until the murder of Caligula, when he was dragged from his hiding place and pro-claimed emperor (41 A. D.). His reign was marked by the restoration of the exiles, the embellishment of Rome, and successes in Germany and Britain. But latterly he became debauched, left the government to his wives, and in particular to Messalina, who with his freedmen committed the greatest enormities. He was poisoned by his fourth wife, Agrippina (mother of Nero).

Clay, the name of various earths, which consist of hydrated silicate of aluminum, with small proportions of the silicates of iron, calcium, magnesium, potassium, and sodium. All the varieties are characterized by being firmly coherent, weighty, compact, and hard when dry, but plastic when moist, smooth to touch. not readily diffusible in water, but when mixed not readily subsiding in it. Their • tenacity and ductility when moist and their hardness when dry has made them from the earliest times the materials of bricks, tiles, pottery, etc. Of the chief varieties porcelain clay, kaolin, or china clay, a white clay with occasional gray and yellow tones, is the purest. Potter's clay and pipe clay, which are similar but less pure, are generally of a yellowish or gravish color, from the presence of iron. Fire clay is a very refractory variety, always found lying immediately below the coal; it is used for making fire bricks, crucibles. etc. Loam is the same substance mixed with sand, oxide of iron, and various other foreign ingredients. The boles, which are of a red or yellow color from the presence of oxide of iron, are distinguished by their conchoidal fracture. The ochres are similar to the boles. contain-ing only more oxide of iron. Other varieties are fullers' earth, Tripoli, and boulder clay, the last a hard clay of a dark brown color, with rounded masses of rock of all sizes embedded in it, the result of glacial action. The distinctive property of clays as ingredients of the soil is their power of absorbing ammonia and other gases and vapors generated on fertile and manured lands; indeed no soil will long remain fertile unless it has a fair proportion of clay in its composition. The best wheats are grown on calcareous clays, as also the finest fruits and flowers of the rosaceous kind.

Ciay, CASSIUS MARCELLUS, American statesman; b. in 1810: graduated at Yale in 1832. He published in 1845 an abolitionist paper entitled The True American. His presses were seized by pro-slavery mobs, and he was threatened with assassination. He was a member of the Kentucky legislature in 1835, 1837, and 1840. During the Mexican War he was taken prisoner. In 1850 he ran as antislavery candidate for governor, but got few votes. In March, 1861, he was appointed minister to Russia. In June, 1862, he was commissioned major general of volunteers, but resigned the following March, and was again sent to St. Petersburg. In 1877 he shot and killed a negro who had threatened his life, and was tried and

acquitted by a jury. Ciay, HENRY (1777-1852), an American states-man; b. in Hanover co., Va. After acting as clerk in two or three state offices he commenced business in 1797 as a lawyer at Lexington, Ky. He soon became famous as a public speaker, and at the age of 26 was a member of the Kentucky legislature. In 1806 he was elected to the U.S. Senate; and in 1811 to the House of Representatives, where he was at once made speaker. In 1814 he proceeded to Europe and acted as one of the commissioners for adjusting the treaty of peace at Ghent between America and Great Britain. He was an unsuccessful candidate for the presidency in 1824, 1832, and 1844. He is best known for his endeavors to shut out European influences from America, and in connection with the "Missouri Compromise of 1820," restricting slavery to the states south of lat. 36° 30' n.; and another similar compromise of 1850 regarding the admission of California, and establishment of territorial governments in New Mexico, Utah, Clay was unquestionably one of the etc. greatest orators America has produced; a splendid party chief, idolized by his followers.

Clay Slate, in geology, a rock consisting of clay which has been hardened and otherwise changed, for the most part extremely fissile and often affording good roofing slate. In color it varies from greenish or bluish gray to lead color.

Clayton, JOHN MIDDLETON (1796-1856), Amefican jurist, b. in Sussex co., Del., educated at Yale, studied law, became U. S. senator, and secretary of state 1850; negotated treaty with England.

Clayton-Bulwer Treaty, a treaty between Britain and the U.S. concluded in 1850, and having reference to the construction of a ship canal across the Isthmus of Panama. Both parties agreed not to erect fortifications here. nor to acquire any part of the Central American territory.

Clayton, Powell, b. at Bethel, Pa., Aug. 7, 1833, and was educated at the Bristol Academy in Pennsylvania, later studying civil engineer-ing at Wilmington, Del. In 1859 he was chosen engineer and surveyor of Leavenworth, Kan., and began his life in the West. At the beginning of the war he enlisted as captain of the First Kansas Infantry, and a year later was appointed lieutenant colonel of the Fifth Kansas Cavalry, in the same year, 1862, being made colonel. The greater part of his military service was carried on in Arkansas. where he led several minor expeditions, for which he was commissioned brigadier general. and where he settled as a planter at the close of the war. In 1868 he was elected governor of Arkansas, and from 1871 to 1877 was U.S. senator. In 1897 he was appointed minister to Mexico.

Clear, CAPE, a promontory 400 ft. high at the southern extremity of Clear Island, and the most southern point of Ireland, about 74 mi. s.e. of Baltimore, county Cork. Clear Island is about 3<sup>1</sup> mi. long and about 1 broad.

It is wild and romantic, and has a fishing population of over 1,000.

Clearing House, a place or institution where the settlement of mutual claims, especially of banks, is effected by the payment of differ-ences called balances. In the earliest history of finance in the Old World experience showed the need and value of a discriminating and definite system of interchanging checks, notes, or other analagous evidences of indebtedness, whereby labor might be saved and the cash balances required in settlements reduced. The Lyons bourse, in France, had in 1667 a system similar in practise to our modern clearinghouse, and the Scotch bank-note exchanges which existed as far back as 1752 were a species of clearing house. But the system, as it exists in this country to-day, originated in London, and in 1810 the Lombard Street Clearing House was established. The joint-stock banks were not admitted until 1854, and four years later. the Country Check Clearing House was established. It was not until 1864 that the Bank of England was admitted into the association, and less than thirty banks in that great city are members to-day. The Vienna, Paris, and Berlin clearing houses were organized in 1864, 1872, and 1883 respectively, but the transactions of none of them are on a scale to compare with that of New York.

Albert Gallatin, one of the early secretaries of the treasury, suggested the adoption of a clearing house system in a pamphlet issued by him in 1831. He recognized the fact that those engaged in the business of banking, by standing together and thus building up mutual confidence, could to a large extent, prevent panics and sustain private credit, and, conse-quently, public credit as well. But his views were slow in finding approval, and it was many years before they were put in practise in this country. The first clearing house organized in America was started in New York City in the year 1853, and during the first year it did a business of \$5,750,455,985. The Boston Clearing House was established in 1856, and that of Philadelphia in 1858. The Chicago Clearing House was organized in 1865, with nineteen members. Its ranks were greatly thinned during the trying financial period from 1873 to 1877, but at present its transactions, as compared with those of 1866, show an increase of 900 per cent.

The following description of the modus operandi of a clearing house will apply to all institutions of the kind in the U. S., as they are conducted without exception on the same general system:—

The clearings are made in a large room capable of holding without inconvenience several scores of persons. Each bank sends two representatives, a clerk and a messenger. Lengthwise of the room run two long rows of high desks, numbered from 1 to 40, or whatever the number of banks in the association is. Upon arriving at the clearing house a few minutes before 11 A.M., each clerk stations himself opposite the number of his bank, after having delivered a ticket at the manager's table, which

## **Clearing Nut**

stands at the head of the double tier of desks. On each ticket respectively, is the total amount of checks brought by each bank. As each ticket is laid before the manager, he enters it to the credit of the bank sending it. He has before him a sheet ruled in four columns, one each for debit and credit amounts of exchanges, and for debit and credit balances. After the incoming tickets are entered and footed, the total represents the credit to all the banks clear-The grand total brought by each bank is ing. subdivided into say twenty other totals. These are represented by bundles of checks strapped together and marked with the amounts charged to the respective banks on which they are drawn, and which should be the sum of checks in each strap. As the gong strikes, the deputies assembled all bend their energies to the work in hand, for time is short, and there is much rapid figuring to be done in five minutes. A procession of messengers, each with a bag or an armful of bundles of checks, moves slowly up and down the outside of the double tier of desks. As they pass in front of each clerk, they deposit before him the checks drawn on the bank he represents. They pass from clerk to clerk a sheet upon which is entered the amount to the debit of each bank, and upon which the clerk receipts for checks so received, also entering upon a book before him the amount opposite the name of the bank delivering them. In about four minutes messenger No. 1 has reached the point from which he started, and each clerk has before him a double column of figures, one representing what he brought, the other what he takes away. The difference between the totals of the two col umns will of course be the balance. If the sum of what he brings exceeds that of what he carries away, he has a credit balance, and vice *rersa.* As soon as he has rapidly footed the columns he fills out a ticket, the following being a sample:

		Chicago,	Aug.	30,	1897.
No 1.	Amount	received		. \$3.	,000,000
	Amount	brought		. 3,	,500,000

Debit—Bal. due Clearing-house ..... Credit—Bal. due National Bank..... 500,000 ..... Settling Clerk.

..... Setting Olerk.

The clerk then hastens with his ticket thus filled out to the manager's desk, who enters the *debtor* amount and balance in the proper column (the *credit* having been already entered). After all the clerks have handed in their tickets, the columns are added up, and if the "amount received" and "amount brought" agree, and the "Dr. balance" and "Cr. balance" also agree, the announcement "all right" is made. The clerks return to their several banks, and by 12:30 all debtor members must be on hand ready to pay in the amount due, and by 12:45 the creditors to collect. This operation is repeated every business day in the year.

**Clearing Nut**, a small tree of the same genus as the nux vomica, common in Indian forests. Its seeds being rubbed on the inside of a vessel

### Cleavage

containing turbid water speedily precipitate the impurities, this result being due it is said to the clarifying effect of the albumin and casein they contain.

Cleavage, the manner or direction in which substances regularly cleave or split. The regular structure of most crystallized bodies becomes manifest as soon as they are broken. Each fragment presents the form of a small polyhedron, and the very dust appears under the microscope an assemblage of minute solids, regularly terminated. The directions in which such bodies thus break up are called their planes of cleavage; and the cleavage is called basal, cubic, diagonal, or lateral, according as it is parallel to the base of a crystal, to the faces of a cube, to a diagonal plane, or to the lateral planes. In certain rocks again there is a tendency to split along planes which may coincide with the original plane of stratification, but which more frequently cross it at an angle: This tendency is the consequence of the readjustment by pressure and heat of the components of rocks, which is one of the phases of metamorphism.

**Cleburne**, Johnson co., Tex., 28 mi. s. of Fort Worth. Railroad: Gulf Colorado & Santa Fé. Industries: railroad machine shops, flour mill, soda water, broom and cigar factories. Surrounding country agricultural. The town was first settled in 1850, and became a city in 1867. Pop. est. 1897, 7,000.

**Cleef** (klaf), 1, JOSEPH VAN, surnamed the Fool (1480-1529), b. at Antwerp, one of the most celebrated painters of his time, who in regard to beauty of coloring may challenge comparison with the Italian masters. 2. JOHN, a painter (1646-1716), belongs to the Flemish school, of which he is one of the most eminent masters. His works show more breadth of style than skill in coloring.

**Clem'atis**, a genus of woody climbing plants. The most common species, virgin's bower or traveler's joy, is conspicuous in the hedges both of England and the south of Scotland, first by its copious clusters of white



blossoms, and afterward by its feather-tailed silky tufts attached to the fruits. The fruit and leaves of the common clematis are acid and vesicant.

Clem'ens, SAMUEL LANGHORNE, an Ameri-

can humorist, b. in 1835, at Florida, Mo., more generally known by his pseudonym, "Mark Twain." He worked for some time as a compositor in Philadelphia and New York, and then in 1851 learned the business of pilot on the Mississippi. Thence he went to the Nevada mines: became in 1862 local editor of a newspaper in Virginia City: went to San Francisco; was for some time a reporter, and worked in the Calaveras gold diggings. In 1806 he went to the Sandwich Islands, and on his return commenced his lecturing career. He edited for a time a paper in Buffalo, and finally married and settled in Hartford, Conn. His chief books are The Jumping Frog, etc.; Roughing It; The Innocents Abroad; Tom Sauyer; A Tramp Abroad; The Prince and the Pauper; Life on the Mississippi; Huckleberry Finn; and Life of Joan of Arc; etc.

Joan of Arc; etc. **Clem 'ent**, the name assumed by many popes, the first being Clement of Rome. CLEMENT XIV who abolished the order of Jesuits, was one of the most distinguished. He d. in 1774.

**Clemen'ti,** MUZIO (1752-1832), pianist and composer. He was engaged as director of the orchestra of the opera in London, and his fame having rapidly increased he went in 1780 to Paris, and in 1781 to Vienna, where he played with Mozart before the emperor. In 1784 he repeated his visit to Paris, but after that remained in England till 1802, when he went back to the Continent. He returned in 1810 to England, where he settled down as superintendent of one of the principal musical establishments in London. He was interred in Westminster Abbey.

**Cleobu'lus,** one of the seren wise men of ancient Greece, a native of Lindus, who traveled to Egypt to learn wisdom, and became king of Rhodes. He flourished B.C. 560.

**Cleom 'enes** (-něz), the name of three kings of Sparta, the most distinguished of whom is Cleomenes III, the last of the Heraclidæ, king from 236 to 220 B. c. He intended to reform Sparta, and to restore the institutions of Lycurgus, and therefore put to death the ephori, made a new division of lands, introduced again the old Spartan system of education, made his brother his colleague, and extended the franchise.

**Cle'on**, an Athenian demagogue. He distinguished himself by the proposal to put to death the adult males of the revolted Mytileneans and sell the women and children as slaves. In 425 he took Sphacteria from the Spartans; but in 423 and 422 he was violently attacked by Aristophanes in *The Knights* and in *The Wusps*. He was sent, however, in 422 against Brasidas, but allowed himself to be taken unawares, and was slain while attempting to flee.

**Cleopat** ra (B. c. 69-30), a Greek queen of Egypt, daughter of Ptolemy Auletës. When she was seventeen her father died, leaving her as joint heir to the throne with his eldest son Ptolemy, whom she was to marry—such marriages being common among the Ptolemies. Being deprived of her part in the government (B. c. 49), she won Cæsar to her cause, and was reinstated by his influence. In a second dis-

## Cleopatra's Needles

turbance Ptolemy lost his life, and Cæsar proclaimed Cleopatra queen of Egypt, though she was compelled to take her brother, the younger Ptolemy, as husband and colleague. Cæsar continued some time at Cleopatra's court, and had a son by her named Cæsarion. By poisoning her brother she remained sole possessor of the regal power, took the part of the triumvirs in the civil war at Rome, and after the battle of Philippi sailed to join Antony at Tarsus. Their meeting was celebrated by splendid festivals; she accompanied him to Tyre, and was followed by him on her return to Egypt. A fter his conquest of Armenia he again returned to her, and made his three sons by her, and also Cæsarion, kings. On the commencement of the war between Augustus and Antony, the latter lost a whole year in festivals and amusements with Cleopatra at Ephesus, Samos, and Athens, and when at last the fleets met at Actium, Cleopatra suddenly took to flight, with all her ships, and Antony immediately fol-lowed her. They fied to Egypt, and declared to Augustus that if Egypt were left to Cleopatra's children they would thenceforth live in retirement. Augustus, however, demanded Antony's death, and advanced on Alexandria. Believing Cleopatra, who had taken refuge in her mausoleum, to be treacherous and dead, Antony threw himself on his sword, and shortly afterward Cleopatra killed herself by applying an asp to her arm to escape the ignominy of being led in a Roman triumph. With her the dynasty of the Ptolemies ended.

**Cleopatra's Needles,** the name given to two Egyptian obelisks, formerly at Alexandria, but one of which is now in New York, the other in London. They are made of the rosered granite of Syene, and were originally erected by the Egyptian king Thothmes III in front of the great temple of Heliopolis, the On of the Scriptures, where Moses was b. They were taken to Alexandria shortly before the commencement of the Christian era, and after the death of Cleopatra, but possibly in pursuance of a design originated by her. The New York obelisk was presented to America by the Khedive of Egypt, and was set up in Central Park in 1881.

**Clep'sydra** (or Waterclock), an ancient instrument for the measurement of time by the escape of water from a vessel through an orifice. In the older ones the hours were estimated simply by the sinking of the surface of the water, in others the water surface is connected with a dial plate and hand by a system of weights and floats.

**Clergy**, the body of ecclesiastical persons, in contradistinction to the *kaity*. The Greek word came into use to indicate that this class was to be considered as the particular inheritance and property of God, or else, which is more probable, because it was customary to select by lot those set apart for special religious functions. At first there was no strongly marked distinction between clergy and laity, but the former soon drew apart, consisting, after the apostolic age, of bishops, priests, and deacons, and in the fourth century of many additional inferior orders, such as sub-deacons, acolytes, etc. With the increased complexity of the hierarchy there was a steady accretion of privileges until the burden of these became intolerable to the laity. Few of these now re-main, the clergy being generally regarded as invested with no inherent claim to regard. A clergyman cannot, however, be compelled to serve as juryman; he is exempted from arrest while celebrating divine worship, from acting as bailiff, constable, or like office. The Episcopalians recognize three classes of clergybishops, priests, and deacons; and generally hold the doctrine of the apostolic succession. Large numbers of Protestants, however, reject this dogma, and believe in the ministry of only one order.

**Clermont-Ferrand**, a town of France, capital of department Puyde-Dôme. It is an antique and gloomy town built of dark volcanic stone. The most remarkable edifices are the cathedral, a huge, irregular, gloomy pile, and the church of Notre Dame, founded in 580. The manufactures are more numerous than extensive; but the position of the town makes it an important center of trade. Pop. 50,119.

**Cleveiand**, Cuyahoga co., O., second city in the state, situated on the south shore of Lake Erie, at the mouth of the Cuyahoga River. There are seven railroads centering at Cleveland: L. S. & M. S.; C. & P.; C. C. C. & I.; N. Y. C. & St. L.; N. Y. L. E. & W.; C. & C.; and the Valley. The most important articles of trade are coal, coke, iron, petroleum, lumber, flour and grain, and wool. The principal manufactures are those under the head of iron industries, also ship and lumber yards, flouring mills, iron foundries and factories, oil and chemical works, brick yards, rolling mills, etc. The city contains several very fine parks and numerous educational institutions. Among the latter are Adelbert College, Case School of Applied Science, and St. Mary's Theological Seminary. The city was first settled in 1706. Pop. est. 1897, 275,000.

Cleveland, GROVER, an American statesman, twice president of the U.S., b. in Caldwell, Essex co., N. J., March 18, 1837. His father, Richard F., was a Presbyterian clergyman. After the death of his father Grover became a clerk and assistant teacher in the N. Y. institution for the blind, and in 1855 he went West. He was admitted to the bar in 1859 in Buffalo. In 1863-1866 he was district attorney of Erie county. He was made sheriff of Erie county in 1870. In 1881 he was elected mayor of Buffalo. In 1882 he was elected governor of New York. He was nominated for president of the U.S. at the National Democratic Convention held in Chicago in 1884, and was inaugurated March 4, 1885, serving until 1889. During the latter part of Cleveland's term the head of the department of agriculture was made a cabinet officer. On March 13, 1885, he issued a proclamation to remove the white intruders from Oklahoma, Indian Territory, and after the burning of Aspinwall, Panama, by the revolutionists, March 31, 1885, ordered a naval expe-dition to protect the Americans and their

property. In 1888 he was Democratic candidate for president, but he was defeated by the Republican candidate, Benjamin Harrison. He then removed to New York, and practised law. On June 2, 1886, he married Miss Frances Folsom, the daughter of Oscar Folsom. The wedding took place in the White House. He was again elected president in 1892 to serve until 1897 and as such opened the World's Columbian Exposition. His second administration was memorable for the stand he took on the financial question, and railroad strikes, and for the Venezuela message.

**Clevenger**, SHOBAL VAIL (1812-1843), American sculptor. His father was a weaver, who went to Cincinnati with his son, and apprenticed him to a stonecutter. He at once manifested artistic ability in carving tombstone work, and learned to hew busts in freestone. Subsequently he chose the career of a sculptor, and as such settled in New York City. Many of his works are contained in the art galleries of New York, Boston, and Philadelphia. In 1840 he went to Rome, where he produced his *North American Indian*. He d. on the Mediterranean, within a day's sail of Gibraltar.

**Cleves** (klēvz), formerly the capital of the dukedom of Cleves, a town in Rhenish Prussia, 70 mi. n.w. of Cologne, about a league from the Rhine, with which it is connected by a canal. It has manufactures of tobacco, leather, and cottons, and a mineral spring with baths, etc. Pop. 10,170.

**Cli'ents**, in ancient Rome, were citizens of the lower ranks who chose a patron from the higher classes, whose duty it was to advise and assist them, particularly in legal cases, and in general to protect them. The clients, on the other hand, were obliged to portion the daughters of the patron if he had not sufficient fortune: to follow him to the wars; to vote for him if he was candidate for an office, etc. This relation continued till the time of the emperors.

Cliff Dwellers, an aboriginal American race of people who built their houses in the cliffs and rocks. Their cave dwellings were often artificial caverns closed and strengthened by stone walls, while their cliff houses were veritable fortresses, to which the inhabitants retreated when menaced by any serious danger. Everywhere on the cliffs, in the inequalities of the rocks, in grottoes and promontories, the Cliff Dwellers succeeded in building their Any situation pleased them provided houses. it gave hope of a little security. These dwellings have even been found hollowed in layers of volcanic ashes hardened by time, while all around pieces of cut silex and fragments of pottery attest the long sojourn of man. One "Cliff Palace" has a length of 421 ft., contains 127 rooms, and 23 estufas, and is capable of affording shelter to 1,500 persons. The dwellings are constructed either of sorted stones held together with moistened clay, or of adobe or sun-dried bricks. The circular ruins contain a number of small cells, and a building, often half subterranean in the center, which

the Spaniards have called an "estufa." Some contend that these estufas were the council chambers where the principal men of the tribe assembled, while others hold that they were meant to keep the sacred fire, which is even to-day an object of veneration with the In-dians. The cliff houses take the shape of the platform on which they stand, and the walls are soldered to the sides of the rock. The walls are built with stones cemented by a mixture of charcoal and ashes, further consolidated by the insertion of small pebbles and bits of pottery. Even to-day the marks of the tools and the workmen's fingers can be seen on the masonry. Sometimes the homes of the Cliff Dwellers were at a great altitude, being as high as 800 ft. above the level of the river. Late researches have revealed the existence of springs which had been tapped and brought into nau-ral and skillfully made reservoirs. The entire San Juan valley is strewn with ruins. There is one long, narrow structure running in front of a cave 200 ft. wide at the mouth, where windows 18 in. sq. are the only means of entrance. there being no door. Several human hands painted in ochre are to be seen on the walls. A small number of cemeteries have been found dating from the epoch of the Cliff people. Recent explorations have brought to light a small number of mummies in a fair state of preservation. Side by side with the bodies, weapons, utensils, and ornaments were found. Like the Mound Builders and all ancient peoples of America, the Cliff Dwellers died in the hope of a future life. Everything points to a civilization superior, and probably posterior, to that of the Mound Builders. There is abundant proof that the family and the owning of private property was established here, as evidenced by the existence of isolated dwellings.

Arizona presents interesting objects of study. The mountains rise to a height of 6.500 ft. above the level of the valley. Everywhere the rock has been pierced, and everywhere had man established his home. The access to them is very difficult. A narrow, dangerous path leads down from the top of the cliff, but is barred by a house built of quarried and wellcemented stone, of better and probably later construction than the other dwellings. Proofs of man's existence have also been found in the lava of volcanoes, extinct in the quaternary period. Agriculture seems to have been more perfect among the inhabitants of Arizona than among the ancient New Mexicans. They cultivated maize, beans, watermelons, cotton, and tobacco. Among their domestic animals we may mention the turkey, and probably the rabbit and species of llama. Neither here nor anywhere else in these regions have the excavations resulted in the discovery of any metal objects, with the exception of a few small amulets made of copper. On the other hand a great variety of pottery has been found, always tastefully decorated. Numerous weapons of polished stone, bone implements, and sea shells have also been discovered. The designs on the Arizona pottery resemble the ornaments in the temple of Mitla, and these again recall

the ancient peoples of Italy. Some of the pottery is shaped after the human form, but more frequently after the forms of animals and The duck seems to have been the favorbirds. ite model with the Mound Builders, and the owl is common with the Cliff Dwellers. Lightness was evidently a quality sought after, and the potter succeeded in reducing the thickness of even the largest vases to a few millimeters. Several pieces had been covered with varnish which on drying gave a brilliant enamel. Arrow heads are found in great numbers, another proof of the struggle for existence carried on by people who had to be ever on the alert to defend themselves against their unknown enemies. A number of irrigation canals bear witness to the industry of the inhabitants. The existence of these canals, wherever they could be of assistance for commerce or agriculture, conveys an idea of the progress realized by these people.

The difficulties attending excavations have necessarily influenced the number of human bones discovered. The works carried out at one place in Arizona produced some 300 skeletons, about 50 of which are complete. The stature is small. The bodies had been laid, dressed in their clothes, and bent double, in a chamber measuring 22 ft. in diameter.

In prehistoric times, distinct races occupied Central America. These races may originally have belonged to one source, but their separation dates from a considerable number of centuries and nothing in the facts we know permits an assertion or denial of the hypothesis. Many centuries, probably, before the coming of the Spaniards, the decadence of these peo-ples had begun. The causes of decadence are manifold. Among the most serious we must reckon the invasion of the Apaches. The Cliff Dwellers made a long but impotent resistance. They had to abandon their homes and wander farther south where their struggles were continued a long time with diminishing success. The destruction of the forests, a prolonged drought, the disappearance of the watercourses, changed the lands into arid deserts and sandy valleys, and the Dwellers had to leave the land where the struggle against nature became impossible.

Clifford, NATHAN (1803-1881), American statesman. Hebecame a lawyer in Maine, and was elected to the state legislature in 1830. In 1834 he became attorney general of the state, and in 1838 was elected to Congress where he served two terms. In 1846 he became attorney general of the U. S., and in 1848-49 was special envoy to Mexico. In 1858 he was nominated associate justice of the U. S. Supreme Court, which office he held until his death. He presided over the Hayes-Tilden electoral commission of 1877.

Commission of 1877. Clifford, WILLIAM KINGDON (1845-1879), English mathematician. In 1871 he was appointed professor of applied mathematics at University College, London. In mathematics his teaching and writings mark an epoch in the history of the science in England. He also wrote on philosophical subjects.

Climate, the character of the weather or atmospheric phenomena peculiar to every country as respects heat and cold, humidity and dryness, the direction and force of the prevailing winds, the alternation of the seasons, etc., especially as such conditions affect animal and vegetable life. In general, geographical latitude is the principal circumstance to be taken into view in considering the climate of a country, and thus the torrid, temperate, and frigid zones may each be said roughly to have a cli-mate of its own. The highest degree of heat is found in the equatorial regions, and the lowest, or the greatest degree of cold, at the poles. In the former the temperature continues practically the same all the year round, though there may be alternating rainy seasons and dry seasons. The variations in temperature are very considerable in the temperate zones, and increase as we approach the polar circles. The heat of the higher latitudes is, in July, greater than that of countries nearer the equator, and at Tornea, in Lapland, where the sun's rays are very oblique even in summer, the heat is sometimes equal to that of the torrid zone, because the sun is almost always above the horizon. But even in the equatorial regions, and still more in intermediate regions, the temperature is affected by local configuration and circumstances. In the deserts of Africa, for instance, owing to the exceptional radiating power of sandy plains and the absence of aqueous vapor in the atmosphere, the heat is excessive, while in the corresponding latitudes of South America the mountainous character of the country makes the climate more moderate. Altitude above the sea indeed has everywhere the same effect as removal to a greater distance from the equator, and thus in the Andes we may have a tropical climate at the sealevel and an arctic one on the mountain summits. The winds to which a country is most exposed by its situation have also a great in-fluence on the climate. In the northern hemisphere if north and east winds blow frequently in any region it will be colder, the latitude being the same, than another which is often swept by milder breezes from the south and west. The climate of Southern Europe, for instance, is decidedly affected by the warm south winds which blow from the hot deserts of Africa. The greater or lesser extent of coast line a country possesses in proportion to its area has a decided influence on the climate. The almost unvarying temperature of the ocean equalizes in some degree the periodic distribution of heat among the different seasons of the year, and the proximity of a great mass of water moderates, by its action on the atmosphere, the heat of summer and the cold of winter. Hence the more equable temperature of islands and coasts as compared with that of places far inland. The British Isles. Tasmania, and New Zealand enjoy a mild or insular climate as compared with, say, Central Russia or Central Asia. Thus it happens that London has a milder winter and a cooler summer than Paris, though the latter is nearly 30 farther south. Similarly, though Warsaw and Amsterdam are almost in the same latitude, the mean annual temperature of the former is 46.48°, while it reaches at the latter 53.4° F. The proximity of large masses of water involves also the presence of much aqueous vapor in the atmosphere, which may be coudensed in abundant rains so as to greatly influence the plant life of a country. Direction of mountain chains, set of ocean currents, nature of soil, are other modifying elements. In exhibiting graphically the chief climatic facts of a region various methods may be adopted. but in all the use of *isothermal lines* is one of the most instructive features. These are lines most instructive features. drawn on a map or chart connecting those places which have the same mean annual temperature or same mean summer and mean winter temperature. In this way we may divide the earth into zones of temperature which by no means coincide with the limits of the zones into which the earth is astronomically divided, and when compared with these on a map show interesting and instructive divergences. Geology teaches that vast changes have taken place in the climate of most if not of all countries, the causes of which are not fully understood.

**Climbing Perch**, a singular fish, remarkable for having the pharyngeal bones enlarged and modified into a series of cells and duplications so that they can retain sufficient water to keep the gills moist and enable the fish to live out of water for six days. The climbing perch of India proceeds long distances overland in search of water when the pools in which it has been living have dried up. It is also cred-



#### Climbing Perch.

ited with a power of climbing the rough stems of palm trees, but as to this latter point authorities disagree.

**Climbing Plants** are plants of weak stems which naturally seek support from their surroundings to rise from the ground. Some are twining plants, rising by winding themselves or their tendrils round the trunks of trees, etc. Such are the honeysuckle and scarlet runner. Others, like the ivy, attach themselves by small roots developed from the stem as they ascend. Some in climbing always twine spirally from right to left, others again always take the opposite direction.

**Clinton**, DEWITT (1769-1828), a famous American statesman and lawyer. He was educated at Columbia College, and in 1788 was admitted to the bar. In 1797 he was elected member of the Assembly. in 1798 member of the senate of the state of New York, and in 1801 member of the Senate of the U.S. For twelve years, with two short breaks, which amounted to three years, he occupied the position of mayor of New York. He was again member of the senate of New York from 1803 to 1811, and lieutenant governor of the state from 1811 to 1813. In 1812 he was defeated by Madison for president. In 1816 he was once more chosen governor of the state; in 1819 he was re-elected, and again in 1824 and 1826.

Clinton, GEORGE (1739-1812), American statesman. In 1768 he was elected to the New York assembly, and in 1775 was a dele-gate to the Continental Congress. In 1777 he was a deputy to the Provincial Congress which framed the state constitution. He was appointed a brigadier general in the Continental army in 1777. He was first governor of the state, serving from 1777 till 1795. In 1780 he thwarted an expedition led by Sir John Johnson, Brant, and Cornplanter, into the Mohawk Valley, and was instrumental in concluding treaties of peace with the Western Indians. In 1783 he accompanied Washington and Hamilton on a tour of the northern and western posts of the state. He helped to suppress Shay's rebellion in 1787. In 1791 he advocated the improvement of internal communication by navigation companies. In 1800 he served in the legislature, and in 1801 was again governor. In 1804 he was elected vice president of the U.S., which office he held until his death.

Clinton, SIR HENRY (1738-1795), British general. He arrived in Boston as major general. 1775. He was second in command in the movements that compelled the Americans to evacuate New York in September, 1775, and was left in command of that city in the summer of 1777. On October 6, he stormed forts Clinton and Montgomery, and was appointed com-mander in chief of His Majesty's forces in America, with the rank of lieutenant general. In June, 1778, he evacuated Philadelphia. and on his retreat through New Jersey fought with Washington at Monmouth Court House. He went to South Carolina in December, 1779. and captured Charleston May 12, 1780. In October, 1781, he set sail for Chesapeake Bay. with a large force, to aid Lord Cornwallis, but, at the entrance of the Chesapeake, he learned that Cornwallis had surrendered; upon hearing which he returned to New York. In June, 1782, he returned to England. He was elected to Parliament, and was afterward make governor of Limerick. In 1793 he was placed in command of Gibraltar, where he died.

**Clinton**, JAMES (1736-1812), American soldier, was the son of Charles Clinton. He was appointed an ensign in the second regiment of the Ulster county militia, in which he became a lieutenant colonel. During the Anglo-French War he distinguished himself at Fort Frontenac, and served in General Montgomery's expedition to Canada. He was made brigadier general in the Continental army in 1776, commanded Fort Clinton when it was attacked by Sir Henry Clinton, Oct. 6, 1777, and was the last man to leave the works. Although suffering from a severe bayonet wound he escaped by sliding down a precipice of 100

ft. to the creek. He took part in General Sullivan's expedition against the Iroquois of Western New Nork in 1779. Afterward he commanded the northern department, stationed at Albany.

**Clinton**, Worcester co., Mass., 45 mi. w. of Boston. Railroad, Boston & Fitchburg. The Nashua River supplies water power to a number of establishments, the principal products being ginghams and plaids, Brussels carpets, and cotton goods. Wirecloth. hollow ware, boots and shoes, and machinery are also manufactured. Pop. est. 1897, 10,000.

**Clinton**, Clinton co., Ia., on Mississippi River, 138 mi. w. of Chicago. Railroads: C. & N. W.; C. B. & Q.; C. M. & St. P.; B. C. R. & N. Industries: sawmills, two flouring mills, several iron foundries, chair, furniture, cracker, mattress, and wagon factories. The town was first settled in 1856. Pop. est. 1897, 24,000.

**Clinton,** Henry co., Mo., 85 mi. s.e. of Kansas City. Railroads: M. K. &. T.; K. C. Ft. S. & M., and K. C. O. & S. Industries: railroad shops, three flouring mills, two iron foundries, potteries, and a large ice plant. Clinton is an important center for the raising and shipping of poultry. Surrounding country agricultural and mineral, coal fields partly developed: four flowing artesian wells. The village was located in 1836; became a city in 1878. Pop. est. 1897, 7,200.

**Cll'o**, in Greek mythology, daughter of Zeus and Mnemosyne; the muse of history. Her attributes are a wreath of laurel upon her head, a trumpet in her right hand, and a roll of papyrus in her left.

**Clith ereo**, a town of England, Lancaster co., 28 mi. n.n.w. of Manchester. It is the seat of some large cotton spinning and weaving establishments, paper factories, foundries, and large print works. Pop. 10,815.

**Cli'tus,** the foster brother of Alexander the Great. He saved Alexander's life at the Granicus, but was afterward slain by him in a fit of intoxication, an act for which Alexander always showed the bitterest remorse.

**Clive**, ROBERT (1725-1774), English general and statesman, was b. in Shropshire. In 1751 Clive, who had already a reputation for skill and courage, marched on the large city of Arcot with 200 British troops and 300 Sepoys, and took it. In 1753 he sailed to England to recover his health. Two years later he was back in India, in governorship of St. David's from which he was soon summoned to command the expedition sent to Bengal. Clive was made governor of Calcutta. Here he was equally successful against the encroachments of the Dutch. He now visited England again. In 1761 he was raised to the Irish peerage with the title of Lord Clive, Baron of Plassey. After a time his health became poor, and in one of his babitual fits of melancholy he put an end to his life.

**Cloca'ca**, an underground conduit for drainage, of which the oldest known example is the great sewer at Rome, built some 2,500 years ago. A portion of it is still standing. It is about 13 ft. high and as many wide. The term is also applied to the excrementory cavity in birds, reptiles, many fishes, and lower mammalia, formed by the extremity of the intestinal canal.

Clock, an instrument for measuring time and indicating hours, minutes, and usually seconds, by means of hands moving on a dialplate, and differing from a watch mainly in having the movement of its machinery regulated by a pendulum, and in not being portable. The largest and most typical clocks also differ in having their machinery set in motion by means of a falling weight or weights, the watch wheel-work being moved by the force of an uncoiling spring; but many clocks also have a spring setting their works in motion. The use of an hour-teller was common even among the ancients, but their time-pieces were nothing else than sun-dials, hour-glasses, and clepsydræ. In the earlier half of our era we have accounts of several attempts at clock construction; that of Boethius in the sixth century, the clock sent by Harun al Rashid to Charlemagne in 809, that made by Pacificus, archdeacon of Verona, in the ninth century, and that of Pope Sylvester II in the tenth century. It is doubtful, however, if any of these was a wheel-and-weight clock, and it is probably to the monks that we owe the invention of clocks set in motion by wheels and weights. In the twelfth century clocks were made use of in the monasteries, which an-nounced the end of every hour by the sound of a bell put in motion by means of wheels. From this time forward the expression "the clock has struck," is often met with. The hand for marking the time is also made mention of. In the fourteenth century there are stronger traces of the present system of clockwork. Dante particularly mentions clocks. Richard, abbot of St. Albans in England, made a clock in 1326, such as had never been heard of till then. It not only indicated the course of the sun and moon, but also the ebb and flood tide. Large clocks on steeples likewise were first made use of in the fourteenth century. Watches are a much later invention, although they have likewise been said to have been invented as early as the fourteenth century. A celebrated clock, the construction of which is well known, was set up in Paris for Charles V in 1379, the maker being Henry de Vick, a German. It probably formed a model on which clocks were constructed for nearly 300 years, and until Huyghens applied the pendulum to clock-work as the regulating power, about 1657. The great advantage of the pendulum is that the beats or oscillations of a pendulum all occupy substantially the same time (the time depending on its length), hence its utility in imparting regularity to a timemeasurer. The mechanism by which comparative regularity was previously attained, though ingenious and simple, was far less perfect; and the first pendulum escapement, that is, the contrivance by which the pendulum was connected with the clock-work, was also less perfect than others subsequently intro-

## **Clodius Pulcher**

duced, especially Graham's dead-beat escapement invented in 1700. In a watch the balance-wheel and spring serve the same purpose as the pendulum, and the honor of being the inventor of the balance-spring was contested between Huyghens and the English philosopher, Dr. Hooke. Various improvephilosopher, Dr. Hooke. ments followed, such as the chronometer escapement, and the addition of a compensation adjustment, by which two metals having unequal rates of expansion and contraction under variations of temperature are combined in the pendulum or the balance-wheel, so that, each metal counteracting the other, the vibrations are isochronous under any change of temperature. This arrangement was perfected by Harrison in 1726, and is especially useful in navigation. The striking machinery of a clock, or that by which hours, quarters, etc., are sounded, is no necessary part of a clock, and forms indeed a separate portion of the works, usually driven by a separate falling weight, and coming into play at certain times. when there is a temporary connection between the two portions of the clock machinery. American methods of clock-making by machinery have revolutionized the clock trade and produced a world-wide market for the products of the Waterbury Clock Company and similar firms. In Liberia there is neither clock nor timepiece of any sort, the reckoning of time being guided entirely by the sun's movement and position.

**Clo' dius Pulcher**, PUBLIUS, a notorious public character of ancient Rome, son of Appius Claudius Pulcher. He served in the third Mithridatic war and filled different high posts in the provinces of the East. Returning to Rome, he became a popular demagogue, was elected tribune in 59 B. c., was the means of procuring Cicero's banishment, and continued to be a ringleader in all the seditions of the time till killed.

**Clois' ter,** an arched way or gallery, often forming part of certain portions of monastic and collegiate buildings, usually having a wall of the building on one side, and an open colonnade, or a series of windows with piers and columns adjoining an interior yard or court on the other side. Such galleries were originally intended as places of exercise and recreation, the persons using them being under cover. The term is also used as equivalent to convent or monastery.

**Clothes Moth**, the name common to several moths whose larvæ are destructive to woolen fabrics, feathers, furs, etc., upon which they feed, using at the same time the material for the construction of the cases in which they assume the chrysalis state.

**Clo'tho,** in Greek mythology, that one of the three Fates or Parcæ whose duty it was to put the wool for the thread of life round the spindle, while that of Lachasis was to spin it, and that of Atropos to cut it when the time had come.

**Cloud,** a collection of visible vapor or watery particles suspended in the atmosphere at some altitude. They differ from fogs only by their

## Cloud

height and less degree of transparency. The average height of clouds is calculated to be 24 mi., thin and light clouds being much higher than the highest mountains, while thick, heavy clouds often touch low mountains, steeples, and even trees. Clouds differ much in form and character, but are generally classed into three simple or primary forms, viz.: 1, The cirrus, so called from its resemblance to a lock



Cirrus

of hair, and consisting of fibers which diverge in all directions. Clouds of this description float at a general height, usually from 3 to 5 mi. above the earth's surface. 2. The cumulus or heap, a cloud which assumes the form of dense convex or conical heaps, resting on a flattish base, called also summer cloud. Under ordinary circumstances these clouds accompany fine weather, especially in the heat of summer. They attain their greatest size early



Cumulus.

in the afternoon and gradually decrease toward sunset. 3, The stratus, so named from its spreading out uniformly in a horizontal layer, which receives all its augmentations of volume from below. It belongs essentially to the night, and is frequently seen on calm summer evenings after sunset ascending from the lower to the higher grounds, and dispersing in the form of a cumulus at sunrise. These three primary forms of clouds are subdivided as follows: 1, The *cirro cumulus*, composed of a collection of clrri, and spreading itself fre-

# Cloud

quently over the sky in the form of beds of delicate snowflakes. 2, The cirro stratus or wane cloud, so called from its being generally seen slowly sinking, and in a state of transformation. When seen in the distance a collection of these clouds suggests the resemblance of a shoal of fish, and the sky, when thickly mottled with them, is called in popular language a mackerel sky. 2, The cumulo stratus or twain cloud, one of the grandest and most beautiful of clouds, and consisting of a collection of large, fleecy clouds overhanging a flat



Stratus.

stratum or base. 4, The nimbus, cumulo-cirrostratus, or rain cloud, recognizable, according to Mr. Howard, by its fibrous border and uniformly gray aspect. It is a dense cloud spreading out into a crown of cirrus and passing beneath into a shower. It presents one of the least attractive appearances among clouds, but it is only when the dark surface of this cloud forms its background that the splendid phenomenon of the rainbow is exhibited in perfection.

**Cloud** (klö), Sr., a town, France, department Seine-et-Oise, 6 mi. s.w. from Paris. It is celebrated for its château and its magnificent park. As the residence of the monarchs of France. St. Cloud is historically interesting. Louis XIV bought the old château and presented it to his brother, who enlarged and transformed it into a splendid palace, which became the residence of Henrietta, queen of Charles I of England, during her exile. It was chosen by Napoleon for his residence, was the summer residence of Napoleon III, and was greatly damaged in the Franco-German War. Pop. 5,163.

**Cloudberry** (or Mountain Bramble), a fruit found plentifully in the north of Asia, America, and Europe, and common in some of the more elevated moors of Britain. The plant is from 4 to 8 or 10 in. high, with a rather large handsome leaf, indented and serrated at the edges. The flowers are large and white, and the berries, which have a very fine flavor, are orange yellow in color, and about the size of a bramble berry.

Clove Bark (or Culil'awan Bark), is fur-

# Cloves

nished by a tree of the Molucca Islands. It is in pieces more or less long, almost flat, thick, fibrous, covered with a white epidermis of a reddish yellow inside, of a nutmeg and clover odor, and of an aromatic and sharp taste.

**Clover** (or Trefoil), a name of different species of plants. There are about 150 species. Some are weeds, but many species are valued as food for cattle. Common red clover, is a biennial, and sometimes. especially on chalky soils, a triennial plant. This is the kind most commonly cultivated, as it yields a larger product than any of the other sorts. White clover is a most valuable plant for pasturage over the whole of Europe, Central Asia, and North America, and has also been introduced into South America. The bee gathers much



A.-White Clover. B.-Red Clover.

of its honey from the flowers of this species. Alsike, hybrid, or Swedish clover, has been long cultivated in the south of Sweden, and for some time also in other countries; it is strongly recommended for cold, moist, stiff soils. It resembles the common red clover in duration, stature, and mode of growth. Perennial red or meadow clover much resembles the common red, but differs somewhat in habit, and the bright red flowers are larger and form a less compact head. Its produce is less in quantity, and not so nutritive, as that of the common red.

**Clover Weevil**, a kind of weevil, different species of which feed on the leaves and seeds of the clover, as also on tares and other leguminous plants.

**Cloves,** a very pungent aromatic spice, the dried flower buds, a native of the Molucca Islands, belonging to the myrtle tribe, now cultivated in Sumatra, Mauritius, Malacca, Jamaica, etc. The tree is a handsome evergreen from 15 to 30 ft. high, with large, elliptic, smooth leaves and numerous purplish

### Clovis

flowers on jointed stalks. Every part of the plant abounds in the volatile oil for which the flower buds are prized. The spice yields a very fragrant odor, and has a bitterish, pungent, and warm taste. It is sometimes em-



a.-branch with leaves, buds, and flowers; b.-bud.

ployed as a hot and stimulating medicine, but is more frequently used in culinary preparations.

**Clovis** (465-511), king of the Franks, succeeded his father Childeric in the year 481, as chief of the warlike tribe of Salian Franks, who inhabited Northern Gaul. In 486 he overthrew the Roman governor at Soissons and occupied the country between the Somme and the Loire. He d. at Paris, which he had made his capital.

Club, a select number of persons in the habit of meeting for the promotion of some common object, as social intercourse, literature, politics, etc. The coffee houses of the seventeenth and eighteenth centuries are the best representatives of what is meant by a modern club, while the clubs of that time were commonly nothing but a kind of restaurants or taverns where people resorted to take their meals. Among the earliest of the London clubs was the *Kit-cat Club*, among whose forty members were dukes, earls, and the leading authors of the day. Another club formed about the same time was the Beefsteak Club. Originally these two clubs had no pronounced political views, but in the end they began to occupy themselves with politics. Perhaps the most celebrated club of last century was that which was first called The Club par excellence, and numbered among its members Dr. Johnson, Sir Joshua Reynolds, Edmund Burke, Oliver Goldsmith, Edward Gibbon, and others. The most important London political clubs

#### Clytemnestra

of the present day are the Carlton Club, a sort of headquarters for the Conservative party, and the Reform Club, the building belonging to which stands next to that of the Carlton Club, the great club of the Liberal party. Clubs and club-life have reached their highest plane in our own country. Every important city numbers in its more important buildings the palatial quarters of some prominent club. New York, Chicago, Boston, Philadelphia, and San Francisco vie with each other in the sumptuous surroundings of their clubs. The Union League, Manhattan and Metropolitan clubs of New York, the Union League and Chicago clubs of Chicago, and a score of others rival in their luxurious appointments the most famous clubs of the Old World.

**Cluny** (klu-nē), a town of Eastern France, 11 mi. n.w. Macon, pop. 4,007. Here was a Benedictine abbey founded in 910, at one time the most celebrated in France, having 2,000 monastic communities directly under its sway in France, Italy, Spain, England, etc., the inmates of which formed the congregation of Cluniac monks. Most of it was destroyed in 1789, and the present town is to some extent built of its debris and occupies its site.

**Cluseret**, GUSTAVE PAUL (1823-1896), French soldier. In 1848, he became chief of a battalion of national guards and chevalier of the Legion of Honor. He served in Algeria and the Crimea, and in 1860 joined Garibaldi. In January, 1862, he entered the service of the U.S. In 1864 he edited a paper in New York City. He was for a short time minister of war under the Commune. He was arrested, but managed to escape both from the Communists and the police of the republic.

Clyde, Colin CAMPBELL, LORD (1792-1863). a famous British soldier, was b. in Glasgow. By the assistance of his mother's relations he was educated at the high school of Glasgow. and afterward at the military academy, Gosport. In 1808 he received an ensign's commission in the Ninth Regiment of Foot. He served in Spain under Sir John Moore and Wellington. In 1819-25 he was in the West Indies. In 1835 he attained the rank of lieutenant colonel. In 1842 he was in China, and on the termination of the Chinese War took active service in India. In 1854 he became major general with the command of the Highland Brigade in the Crimean War. On the outbreak of the Indian mutiny he was appointed to the chief command there. Land-ing at Calcutta on Aug. 29, 1857, he relieved Havelock and Outram at Lucknow, and crushed the rebellion entirely before the end of the year. He was created a peer with the title of Baron Clyde, and had an income of \$10,000 a year allotted him. In 1862 he was made field marshal. He was buried in Westminster Abbey.

**Clytemnestra**, in Greek mythology, daughter of King Tyndareus and Leda, and half sister of Helen. During the absence of Agamemnon in the war against Troy she bestowed her favors on Ægisthus, and, in connection with him, murdered Agamemnon on his return from Troy, and, together with her paramour, governed Mycenæ for seven years.

Coach, a general name for all covered carriages drawn by horses and intended for the rapid conveyance of passengers. The earliest carriages appear to have been all open. At Rome both covered and uncovered carriages were in use. After the fall of the Roman Empire they went out of use again, and during the feudal ages the custom was to ride on horseback, the use of carriages being considered effeminate. They do not appear to have become common till the fifteenth century, and even then were regarded exclusively as vehicles for women and invalids. Later on they became, especially in Germany, part of the appendages of royalty. They seem to have been introduced into England about the middle of the sixteenth century, but were for long confined to the aristocracy and the wealthy classes. Hackney coaches were first used in London in 1625. They were then only twenty in number, and were kept at the hotels, where they had to be applied for when wanted. In 1634 coaches waiting to be hired at a particular stand were introduced. Stage coaches were introduced into England about the same time as hackney coaches. The first stage coach in London appears to have run early in the seventeenth century, and before the end of the century they were started on three of the principal roads in England. Their speed was at first very moderate, about 3 or 4 miles an hour. They could only run in the summer, and even then their progress was often greatly hindered by floods and by the wretched state of the roads generally. Mail coaches next followed. The manufacture of elegant carriages is a proof of much wealth and mechanical skill in a place, many different workmen being employed in their construction, and both the materials and the workmanship requiring to be of the best.

**Coahuila** ( $k\hat{v}$ -å-wē'lå), a state of Mexico, on the frontier of the U. S., rich in woods and pastures, and having several silver mines. Area 50,890 sq. mi.; pop. 130,026.

Coal, a solid, opaque, inflammable substance, mainly consisting of carbon, found in the earth, largely employed as fuel, and formed from vast masses of vegetable matter deposited through the luxuriant growth of plants in former epochs of the earth's history. In the varieties of coal in common use the combined effects of pressure, heat, and chemical action upon the substance have left few traces of its vegetable origin; but in the sandstones, clays, and shales accompanying the coal, the plants to which it principally owes its origin are presented in a fossil state in great profusion, and frequently with their structure so distinctly retained, although replaced by mineral substances, as to enable the microscopist to determine their botanical affinities with existing species. The sigillaria and stigmaria, the lepidodendron, the calamite, and tree ferns are among the commoner forms of vegetable life in the rocks of the coal formation. Trees of considerable magnitude have also been brought

to light, having a recognizable relation to the modern araucaria. The animal remains found in the coal-measures indicate that some of the rocks have been deposited in fresh water. probably in lakes, while others are obviously of estuarine origin, or have been deposited at the mouths of rivers alternately occupied by fresh and salt water. The great system of strata in which coal is chiefly found is known as the Carboniferous. There are many varieties of coal, varying considerably in their composition, as anthracite, nearly pure carbon, and burning with little flame, much used for furnaces and malt kilns; bituminous (popularly so called) or "household coal"; and cannel or "gas coal," which burns readily like a candle, and is much used in gas making. All varieties agree in containing from 60 to over 90 per cent. of carbon, the other elements being chiefly oxygen and hydrogen, and frequently a small portion of nitrogen. Lignite or brown coal may contain only 50 per cent. carbon. For manufacturing purposes coals are generally considered to consist of two parts, the volatile or bituminous portion, which yields the gas used for lighting, and the substance, comparatively fixed, usually known as coke, which is obtained by heating the coals in ovens or other close arrangements. Coal was known to the ancients and to the Britons before the Roman invasion, and was used for fuel in England as early as 852 A.D. When coal was first used in the arts in London, it was objected to as injurious to health, and a proclamation was issued against its use, 1316. The first charter giving permis-sion to dig coal was granted by Henry III, 1239. In 1281 the Newcastle coal trade became so important that laws were passed for its regulation. The steam engine applied to the collieries about 1715 introduced into England a new era in mining, and trade in coal increased extensively. The coal beds of Great Britain occupy an area of less than 12,000 sq. mi. Coal deposits of the U. S. exceed in area, variety, and excellence those of any other country in the world. Coal was first utilized in the U.S. in revolutionary times for the manufacture of arms. In 1789 coal was shipped from Richmond, Va., to Philadelphia, New York, and Boston. Coal was first used in a grate by Judge Jesse Fell, Wilkesbarre, Pa., 1808. The area of American coal fields is about 200 000 coming the most internet internet. about 200,000 sq. mi., the most important of which is the Appalachian, covering about 60,-000 sq. mi., extending through the states from Pennsylvania to Alabama. The anthracite district of Pennsylvania is the most important. Coal was first discovered in America by Father Hennepin, near what is now Ottawa. Ill. The first coal mined in the U. S. (1813) was sold at Philadelphia for \$21 per ton. The first regular shipment of coal from the Pennsylvania mines was in 1820. The annual production from the Pennsylvania coal fields is valued at more than \$59,000,000. Of bituminous coal Ohio and Illinois are most productive. Germany, France, and Belgium produce coal less extensively than the U. S. and Great Britain. The coal beds of Russia have been little
worked. Immense coal fields are known to exist in China, Japan, Australia, and Canada.

**Coal Brass**, the iron pyrites found in coal measures, so named on account of its brassy appearance. Coal containing much pyrites is bad for iron smelting, and it is unpleasant for domestic use on account of the sulphurous acid which it gives off on burning. Coal brass is useful in the manufacture of copperas and in alkali works.

**Coal Cutting Machine**, any machine for cutting out coal in the pit, the chief objects they are intended to serve being the cheapening of the work, the saving of a large quantity of coal, which in the ordinary process of holing by hand labor with the pick is broken up into slack and dust, and the removal of the danger attending upon the employment of hand labor. The instruments of excavation in these machines are constructed on various principles, some having an action like that of an ordinary pick, others a horizontal cutting tool. There are usually arrangements for regulating the depth and force, and to a certain extent the direction, of the blow, and the precision obtained is fully equal to that of hand labor.

**Coal Fish**, a species of the cod genus, named from the color of its back. It grows to the length of 24 ft., and is found in great numbers about the Orkneys and the northern parts of Britain.

**Coal Gas,** the variety of carbureted hydrogen which produces common gaslight.

**Coal Tar** (or Gas Tar), a substance obtained in the distillation of coal for the manufacture of illuminating gas, a dark-colored more or less viscid mass, consisting principally of oily hydrocarbons. It passes over with the gas into the condensers along with ammonia liquor, but being heavier than the latter, it is easily separated from it when the whole is allowed to stand. It was formerly of comparatively little use; but in recent years a great number of valuable products have been derived from it by distillation, such as ammonia, naphtha, creosote, carbolic acid, and benzine, while it is also the source of the whole series of aniline colors, and other dyes, of alizarine, salicylic acid, etc.

**Coast Mountains** (Coast Range), a range or series of ranges extending along the west of California at no great distance from the Pacific coast, and rising to the height of 8,500 ft.

**Coatbridge,** a town in Scotland, Lanarkshire, 94 mi. e. of Glasgow. The district abounds in coal and ironstone. Pop. 17,500.

**Co'ati** (or Coati Mondi), a name of South American plantigrade carnivorous mammals, belonging to the Ursidæ or bears, but recalling rather the raccoon or civets, and having a long proboscis or snout. They feed on worms, insects, and the smaller quadrupeds, but chiefly on eggs and young birds.

**Co'balt**, a metal, of a grayish white color, very brittle, of a fine close grain, compact, but easily reducible to powder. It crystallizes in parallel bundles of needles. It is never found in a pure state. Its ores are arranged under the following species, viz., *arsenical cobalt*, of a white color, passing to steel gray; its texture is granular, and when heated it exhales the odor of garlic; gray cobalt, a compound of cobalt, arsenic, iron, and sulphur, of a white color, with a tinge of red; its structure is foliated, and its crystals have a cube for their primitive form; sulphide of cobalt, compact and massive in its structure; oxide of cobalt, brown or brownish black, generally friable and earthy; sulphate and arsenate of cobalt, both of a red color, the former soluble in water. The great use of cobalt is to give a permanent blue color to glass and enamels upon metals, porcelain, and earthenwares.

**Cob** bett, WILLIAM (1762-1835), English writer and politician, was the son of a farmer. In 1783 he went to London and obtained a situation as copying clerk to an attorney, but after nine months he enlisted into the Fiftyfourth Foot, and shortly after went with the regiment to Nova Scotia. Four years later he was promoted to sergeant major. He obtained his discharge, married, and proceeded to America. Under the signature of "Peter Porcupine," he wrote papers and pamphlets of a strongly anti-republican tendency. In 1800 he started first the Porcupine, then the Weekly Political Register. In 1824-7 appeared his History of the Reformation. On the passing of the Reform Bill in 1832 he was returned as member for Oldham. Cobbett is also the author of a Parliamentary History of England from the Conquest to 1803; Advice to Young Men and Women; Village Sermons, etc.

**Cobb.** HOWELL (1815-1868), American statesman, b. in Cherry Hill, Ga. In 1837 he was elected solicitor general of the western circuit of Georgia, and in 1843 was elected to Congress. In 1849 he was elected speaker. In 1851 he was elected governor of Georgia, serving until 1853. In 1855 he was again elected to Congress, and later was made secretary of the treasury, serving from 1857 to 1860. When the war came up he was appointed brigadier general, and subsequently major general, but took no part in military movements.

Cob' den, RICHARD (1804-1865), English politician, the "apostle of free trade." After receiving a very meager education he was taken as an apprentice into a warehouse in London. In 1830 he started a cotton manufactory in Manchester. His first political writing was a pamphlet on England, Ireland, and America. In this he gave clear utterance to the political views to which he continued through his life to adhere, advocating non-intervention in the disputes of other nations, and maintaining it to be the only proper object of the foreign policy of England to increase and strengthen her connections with foreign countries in the way of trade and peaceful intercourse. In 1841 he entered Parliament as member for Stockport. Next year he was chosen member for the West Riding of York, a constituency which he represented for ten years. In 1859 he was chosen member for Rochdale. During his later years he lived a good deal in retirement.

Cob'lentz, a fortified town of Germany.

### Cobourg

capital of Rhenish Prussia, on the Rhine in the angle between it and the Moselle, and connected by a pontoon bridge over the Rhine with the fortress of Ehrenbreitstein, this, along with its other fortifications, rendering it one of the strongest places in Germany, and capable of accommodating 100,000 men. Its industries embrace cigars, machinery, champagne wines, pianos, and it has an important trade in Rhine and Moselle wines. Pop. 31,669.

and Moselle wines. Pop. 31,669. Cobourg, a port of Canada, prov. Ontario, on Lake Ontario, 69 mi. e. by n. of Toronto. It is well built, has sundry manufactures, a good harbor, and an increasing trade. Pop. 4,957.



Cobra de Capello (that is, "snake of the hood"), the Portuguese name of the hooded or spectacled snake which is found in Southern Asia, a closely allied species called cobra, or asp, being found in Egypt. It is called spectacled snake from a singular marking on the back of the neck. So exceedingly poisonous is its bite, that in numerous instances death has followed within a few minutes. and under ordinary circumstances a few hours is the longest term where

Head of Cobra.

prompt measures have not been taken. In India thousands of natives lose their lives yearly through cobra bites. Its food consists of small reptiles, birds, frogs, fishes (being an excellent swimmer), etc. Its great enemy is the ichneumon.

**Co'burg**, a town, Germany, capital of the duchy of Saxe-Coburg-Gotha, 106 mi. e. by n. Frankfort-on-the-Main. The principal buildings are the palace of the Duke of Saxe-Coburg-Gotha, and on an eminence overhanging the town the ancient castle of the dukes of Coburg, in which are still shown the rooms occupied by Luther during his concealment here, with his bedstead and pulpit. Coburg has various manufactures, also extensive breweries. Pop. 16,210.

**Coca**, a South American plant. The leaf is a stimulating narcotic, and is chewed by the inhabitants of countries on the Pacific side of South America, mixed with finely powdered chalk. It has effects somewhat similar to those of opium. A small quantity of it enables a person to bear up against fatigue even when receiving less food than usual; and it prevents the difficulty of respiration experienced in climbing high mountains. Coca leaves depend for their influence on a crystallizable alkaloid called *cocaine*, which, besides having effects similar to the leaf, possesses valuable anæsthetic properties, and in recent times has been especially employed to prevent sufferings in operation on the eye, having also similar effects when applied to the tongue, larynr, ear, etc.



Coca; a.-flower; b.-fruit.

**Coc'culus**, a genus of East Indian menispermaceous plants, consisting of climbers with heart-shaped leaves and small flowers. The species are generally powerful bitter febrifuges. The fruit of the *Cocculus Indicus* 



Cocculus Indicus; a.-branch with leaves; b.panicle of female inflorescence; c.-a female flower; d.-the same with sepals removed; c.male flower; f.-fruit.

forms a considerable article of commerce, and is sometimes added to malt liquors to give bitterness.

**Coccus, a** genus of insects of the order Hemiptera, family Coccidæ, or scale insects. The males are elongated in their form, have large wings, and are destitute of any obvious means of suction; the females, on the contrary, are of a rounded or oval form, about an eighth of an inch in length, have no wings, but possess a beak or sucker, by which they suck up the juices of the plants on which they live. At a certain period of their life the females attach themselves to the plant or tree which they inhabit, and remain thereon immovable

### Cochabamba

during the rest of their existence. In this situation they are impregnated by the male; after which their body increases considerably, in many species losing its original form and assuming that of a gall, and, after depositing the eggs, drying up and forming a habitation for the young. Some of these insects are troublesome in gardens, plantations, and hothouses, while others are of great value. For example, kermes, cochineal, lac-lake, lac-dye, and gum-lac are either the perfect insects dried, or the secretions which they form. Kermes consist of the dried females of Coccus ilicis, found in great abundance upon a species of oak, a native of the Mediterranean basin, and gathered before the eggs are hatched. Cochineal consists of the bodies of the females of the Coccus cacti, a native of Mexico, which feeds on various species of cactus, particularly on one called nopal.

**Cochabam'ba** (koch-), a town in the interior of Bolivia, capital of the province of Cochabamba, situated in a fertile valley 8,435 ft. above the level of the sea, with good trade and considerable manufactures. Pop. 26,330.

Coch'in, a seaport, Hindustan, Malabar district. Madras presidency. Cochin was one of the first places in India visited by Europeans. In 1502 Vasco da Gama established a factory, and soon after Albuquerque built a fort. In 1663 the Dutch took the place, in 1795 the British. Pop. 15,698. Cochin-China, a country forming part of the

peninsula of Southeastern Asia, and generally regarded as comprising the whole of Anam and Lower or French Cochin-China. The latter belonged to Anam till, in 1863, a portion of it was finally ceded to France after a war occasioned by the persecution of French missionaries; another portion being declared French territory in 1867. The territory thus acquired covers 27,020 sq. mi.; pop. 4,600,000. In the low and wet grounds much rice is grown. In the more elevated districts are grown tobacco, sugar cane, maize, indigo, and betel. Among the other products are tea, gums, cocoanut oil, The climate is hot and unsuited silk, spices. for Europeans. Industrial arts are as yet limited among the natives. But they excel in the use of wood, of which their temples, pagodas, and tombs are built, being ornamented with elaborate carving. The principal export is rice, mainly to China; cotton and silk are also exported.

**Cochin-China**, a term applied to a variety of domestic fowl, imported from Cochin-China. It is a large ungainly bird, valuable chiefly owing to its fecundity, eggs being laid even during the winter.

**Cochineal** (koch'i-nēl), a dye-stuff consisting of the dried bodies of the females of a species of insect, *Corcus Cacti* a native of the warmer parts of America, particularly Mexico, and found living on a species of cactus called the cochineal fig. The insects are brushed softly off, and killed by being placed in ovens or dried in the sun, having then the appearance of small berries or seeds. A pound of cochineal contains about 70,000 of them. The

### Cockchafer

finest cochineal is prepared in Mexico, where it was first discovered. Cochineal produces crimson and scarlet colors, and is used in making carmine and lake.



Cochineal; a.-living on cactus; b.-male; c.-female.

**Cockatoo'**, the name of a number of climbing birds belonging to the family of the parrots, or regarded as forming a distinct family. They have a large, hard bill: a crest capable of being raised and lowered at the will of the bird, commonly white, but sometimes yellow, red, or blue: a tail somewhat longer than that of the parrot, and square or rounded long wings; and, for the most part. a white plumage; though in some genera the plumage is dark. They are found especially in the Eastern Archipelago, and Australia. They live on roots, fruits, grain, insects, etc., and usually congregate in flocks. These birds are easily tamed.

**Cockburn**, ALEXANDER (1802-1880), British jurist. He was successively solicitor general, attorney general, and chief justice, and in 1871 was one of the arbitrators of the Geneva claims.

**Cock' chafer**, a species of lamellicorn beetle remarkabe for the length of its life in the worm



Cockchafer (Meldontha rulgarts); a....full-grown larva; b...pupa; c. – perfect insect.

or larva state, as well as for the injury it does to vegetation after it has attained its perfect condition. The common cockchafer is hatched from an egg which the parent deposits in a hole about 6 in. deep, which she digs for the purpose. At the end of about three months the insect emerges as a small grub or maggot, and feeds on the roots of vegetables in the viconity. When full grown it is over an inch in length: it makes its way underground and commits great devastation on grass and corn crops. In the fourth year the insect appears as a perfect coleopterous insect-a beetle over an inch long, of a black color, with a whitish down. It usually emerges from the ground about the beginning of May, from which circumstance the name may bug or beetle has been given it. In its perfect state it is very destructive to the leaves of various trees.

**Cock Fighting,** an amusement practised in various countries, first perhaps among the Greeks and Romans. At Athens there were annual cock fights, and among the Romans quails and partridges were also used for this purpose. It was long a favorite sport with the British, and the training, dieting, and breeding of cocks for fighting was the subject of many treatises. It is a favorite sport in this country and Cuba.

**Cockle**, a name for the bivalve molluscs of the genus *Cardium*, common on the sandy shores of the ocean, much used as food. The general characteristics are: shells nearly equilateral and equivalvular; hinge with two small teeth. one on each side near the beak, and two larger remote lateral teeth, one on each side; prominent ribs running from the hinge to the edge of the valve.

**Cock of the Rock**, a South American bird of a rich orange color with a beautiful crest, belonging to the manakin family.

**Cock' roach**, a genus of insects belonging to the straight-winged order, characterized by an oval, elongated, depressed body, which is



#### Common Cockroach. a.-female; b.-male.

smooth on its superior surface. They have parchment-like elytra, and in the female the wings are imperfectly developed. They are nocturnal in their habits, exceedingly agile, and devour provisions of all kinds. Cockroaches, like other orthopterous insects, do not undergo a complete metamorphosis; the larvæ and nymphs resemble the perfect insect, except that they have merely rudiments of wings. The eggs are carried below the abdomen of the female for seven or eight days till she finally attaches them to some solid body by means of a gummy fluid. The species are numerous. The common kitchen cockroach was originally brought from Asia to Europe, and thence to America, where it is now common. The American cockroach grows to be 2 or 3 in. long.

**Cock's-foot** (Cock's-foot-grass), a perennial pasture grass of a coarse, harsh, wiry texture. but capable of growing on barren, sandy places, and yielding a valuable food for sheep very early in the spring. The name has been given to it because of the resemblance of its three-branched panicle to the foot of a fowl.

Co'coa, a name given to the ground kernels of the cacao or chocolate tree prepared to be made into a beverage. Cocoa is chocolate from which the oil has been extracted. One half of the cocoa bean is cocoa butter. Cocoa butter is used by confectioners in making In making cocoa the chocolate is candy. taken from the machine which grinds it. placed in little canvass bags, and put into a hydraulic press, where a pressure of 70 tons drives the oil out of the chocolate and leaves the cocoa in dry, oilless lumps which are broken with a mallet, and are taken away to be ground up for further operations. If the cocoa is wanted for drinking purposes it is ground into a flour-like substance and packed in tin boxes. If for eating or for confectioners, it is mixed with flavoring compounds in a mixing mill, after the sugar has been thoroughly incorporated with the cocoa by passing the whole mixture through rolls. Several the whole mixture through rolls. varieties of cocoa are mixed and blended during the process, and it is the success of this blending upon which the quality of the cocoa depends.

**Cocoa Butter** is a product of the cocoanut. After the milk has been extracted from the cocoanut, the white meats are broken into fine pieces and sent to the mill, where the rich oil is boiled and pressed out of them. A thousand nuts will yield about 25 gallons of oil. This oil is run into huge pipes holding 2,000 to 3,000 pounds each, where it hardens into a pure In this white substance not unlike tallow. form it is shipped to the factories. In the factory the oil is reduced to a rich yellow liquid in large tanks. These tanks are made double, and when the oil is inside it can be raised to a high temperature by the water in the jacket. A solution is put in to kill the fermenting germs of the oil. The oil next goes to the centrifugal machine, where it is The velocity of this remixed with water. volving bowl is about 4,000 revolutions per minute, and throws off the water and the germ-killing solution through one spout and the oil through another. The oil is carried to the storage tanks, where it is weighed. It then goes into tin vats partly filled with water. Here it is treated to a blast of cold air which granulates the oil until it looks like little lumps of pure white butter floating in butter-



#### Cocoanut

milk. It is skimmed off with large skimmers. leaving the water. It is then loaded into trucks and left in the storeroom for several days to develop acids. It is then put into an ordinary creamery churn and butter worker where the water is thoroughly squeezed out of If the butter is to be used for table purit. poses a little half-churned cream and butter color is put in. The greater part of the cocoanut butter is left white, in which condition it is almost tasteless and odorless. It is used in the kitchen in the place of cheap butter or lard. Cocoanut butter, by chemical analysis, is shown to have the same ingredients as real butter, with the exception of butyric acid, in the place of which it contains lauric acid.

**Co' coanut** (or Coco-nut), a woody fruit of an oval shape, from 3 or 4 to 6 or 8 in. in length, covered with a fibrous husk, and lined internally with a white, firm, and fieshy kernel. The tree which produces the cocoanut is a palm, from 40 to 60 ft. high. The trunk is straight



Cocoanut Palm (Cocos nuciferal, a.-portion of young spathe, with enclosed inflorescence; b.branch of spadix; c.-smailer portion enlarged, showing a female flower below, and male flower above; d.-cocoanut; c.-husk cut open, showing hard endocarp, at f opened to show the single seed.

and naked, and surmounted by a crown of feather-like leaves. The nuts hang from the summit of the tree in clusters of a dozen or more. The external rind of the nuts has a smooth surface. This encloses fibrous substance of considerable thickness, which surrounds the nut. The latter has a thick and hard shell, with three black scars at one end, through one of which the embryo of the future tree pushes its way. The kernel encloses a considerable quantity of sweet and watery liquid, of a whitish color, which has the name of *milk*. This palm is a native of Africa, the East and West Indies, and South America, and is now

### Cod-Liver Oll

grown almost everywhere in tropical countries. Food, clothing, and the means of shelter and protection, are all afforded by the cocoanut tree. The kernels are used as food in various modes of dressing, and yield, on pressure, an oil which is largely imported into various countries. When dried before the oil is expressed, they are known as *copra*. The fibrous coat of the nut is made into the well-known cocoanut matting; the coarse yarn obtained from it is called coir, which is also used for cordage. The hard shell of the nut is polished and made into a cup or other domestic utensil. The fronds are wrought into baskets, brooms, mats, sacks, and many other useful articles; the trunks are made into boats, or furnish timber for the construction of houses. By boring the tree a white, sweetish liquor called toddy exudes from the wound, and yields by distillation one of the varieties of the spirit called arrack. A kind of sugar called jaggery is also obtained from the juice by inspissation.

**Cocca Plum**, a fruit which is eaten in the West Indies. It is about the size of a plum. with a sweet and pleasant though somewhat austere pulp.

**Coccoon'**, the name given to the web or ball spun by caterpillars before passing into the chrysalis state. The valuable product thus obtained from the silkworm is well known.

**Cod**, a genus of well-known, soft-finned fish. is distributed throughout the temperate seas of Europe, Asia. and America. It feeds in water 25-50 fathoms deep. Its voracity in-clines it to take greedily almost any bait. The clines it to take greedily almost any bait. The genus is characterized by three dorsal and two anal fins, and a single barbel. The cod is prolific and spawns in February. The roe of a female forms more than half its weight. Roe is used for food, and in France, for bait in sardine fishing. Cod reaches maturity about the end of the third year, but second year cod are marketable. Ordinarily a cod weighs from 12 to 20 lbs., but some have been taken weighing from 50 to 70 lbs. The best months for cod fishing are October, November and December. The most noted cod fisheries in the world are off the coasts of Newfoundland. The London market is supplied from the coasts of Norfolk and Suffolk, where the cod is taken with hook and line and carried to market alive in well-boats. Salted and dried cod are exported to all parts of the world. From the swimming bladder of the cod is obtained isinglass, and from the liver. cod-liver oil. which is used in cases of rheumatism and pul-monary consumption. The Norwegians are said to feed cod heads with marine plants to cows to increase the quantity of milk. Dried cod bones furnish them with fuel. At Point Logan, in Wigtonshire, cod is cultivated in a great reservoir scooped out of solid rock. A barrier of stone through which the water has free egress, prevents the escape of the cod. The fish are fed on mussels and become very tame. Their flavor is superior to that of cod taken from the open sea.

**Cod-Liver Oil,** an oil extracted from the livers of different kinds of cod — the common

cod being specified in the pharmacopæia and allied species. The finest and palest oil is got from fresh and carefully cleaned liver, the oil being extracted either in the cold or by a gentie heat. The darker kinds are got at a higher temperature, and often from the livers in a putrefying state. Only the pale oils are used in medicine; the dark oils are too rank and acrid, and they are only used in dressing leather. Cod-liver oil is a somewhat complex substance, but the main ingredients appear to be olein and margarin. Acetic, butyric, and other acids are also present, and to these the oil may owe some of its odor. **Cod'rus**, according to Greek legend the last

**Cod<sup>7</sup> rus,** according to Greek legend the last king of Athens. Having learned that the enemies of his country would be victorious, according to the declaration of an oracle, if they did not kill the Athenian king, he voluntarily entered their camp, provoked a quarrel, and was slain. The grateful Athenians abolished the royal dignity, substituting that of archon, esteeming no one worthy to be the successor of Codrus.

Cody, WILLIAM F. (better known as "Buffalo Bill"), b. in Scott co., Iowa, 1845. He spent the early part of his life among the Indians on the Western frontier until the Civil War broke out, when he offered his services as a Union scout. He rendered valuable service during the war to several commanders. Cody was a member of a camp of U. S. troops which protected the laborers during the construction of the Union Pacific R. R., and took the contract to supply the entire force with fresh buffalo meat for a certain period, hence his soubriquet of "Buffalo Bill." Later he took to the stage, and finally collected a band of Indians, cowboys, rough riders, unbroken bronchos, and a small herd of buffalo, and commenced a series of exhibitions in the principal cities of America. The show is known as the "Wild West." He made a tour through the principal cities of Europe in 1802. He is at present managing this show with success.

**Coe**, GEORGE S., American financier, b. in Newport, R. I., in 1817. He began life as a bank clerk in 1834. In 1855 he became connected with the American Exchange National bank, first as vice-president and later as president. In 1858 he was instrumental in organizing the New York clearing house banks into an association.

**Coelentera'ta**, a sub-kingdom of animals, including those whose alimentary canal communicates freely with the general cavity of the body ("the somatic cavity "). The body is essentially composed of two layers of membranes, an outer layer and an inner layer. No circulatory organs exist, and in most there are no traces of a nervous system. Peculiar stinging organs or "thread-cells" are usually present, and in most cases there is a radiate or starlike arrangement of the organs, which is especially perceptible in the tentacles, which are in most instances placed round the mouth. Distinct reproductive organs exist in all, but multiplication also takes place by fission and budding. The Cœlenterata are divided into two great sections, the Actinozoa and the Hydrozoa, and include the medusas, corals. sea-anemones, etc. They are nearly all marine animals.

**Coffee** is the seed of an evergreen shrub which is cultivated in hot climates, and is a native of Abyssinia and of Arabia. This shrub is from 15 to 20 ft. in height. The leaves are green, glossy on the upper surface, and the flowers are white and sweet-scented. The fruit is of an oval shape, about the size of a cherry, and of a dark red color when ripe. Each of these contains two cells, and each cell a single seed, which is the coffee as we see it before it undergoes the process of roasting. Great attention is paid to the culture of coffee in Arabia. The trees are raised from seed sown in nurseries and afterward planted out in moist and shady situations, on



#### Coffee; branch with fruit.

sloping grounds or at the foot of mountains. Care is taken to conduct little rills of water to their roots, which at certain seasons require to be constantly surrounded with moisture. When the fruit has attained its maturity cloths are placed under the trees, and upon these the laborers shake it down. They afterward spread the berries on mats, and expose them to the sun to dry. The husk is then broken off by large and heavy rollers of wood or iron. When the coffee has been thus cleared of its husk it is again dried in the sun, and, lastly, winnowed with a large fan, for the purpose of clearing it from the pieces of husks with which it is intermingled. A pound of coffee is generally more than the produce of one tree; but a tree in great vigor will produce 3 or 4 lbs. The best coffee is imported from Mocha, on the Red Sea. It is packed in large bales, each containing a number of smaller bales, and when good appears fresh and of a greenish olive color. Next in quality to the Mocha coffee may perhaps be ranked that of

36

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Southern India and that of Ceylon, which is strong and well flavored. Java and Central America also produce large quantities of excellent coffee. Brazilian coffee, though produced more abundantly than any other, stands at the bottom of the list as regards quality. Liberian coffee may also be mentioned. Of the best Mocha coffee grown in the province of Yemen little or none is said to reach the Western markets. Arabia itself, Syria, and Egypt consume fully two thirds, and the remainder is exclusively absorbed by Turkish or Armenian buyers. The only other coffee which holds a first rank in Eastern opinion is that of Abyssinia. Then comes the produce of India which those accustomed to the Yemenite variety are said to consider hardly drinkable. The Dutch were the first to extend the cultivation of coffee beyond the countries to which it is native. About 1690 some coffee seeds were brought to Java, where they were planted and produced fruit. By 1718 the Dutch planters of Surinam had entered on the cultivation of coffee with success, and ten years after, it was introduced from that colony by the English into Jamaica, and by the French into Martinique. It was not till 1774 that the planters of Brazil, now the greatest producers of coffee in the world, commenced its cultivation. Coffee as an article of diet is of but comparatively recent introduction. To the Greeks and Romans it was wholly unknown. From Arabia it passed to Egypt and Turkey, whence it was introduced into England. In Great Britain much less is drunk than on the Continent of Europe or in the U.S. and Canada. The excellence of coffee depends in a great measure on the skill and attention exercised in roasting it. If it be too little roasted it is devoid of flavor, and if too much it becomes acrid, and has a disagreeable, burned taste. Coffee is used in the form either of an infusion or decoction, of which the former is decidedly preferable, both as regards flavor and strength. Since the middle of the eighteenth century both the culture and consumption of coffee have continually increased. The principal supply of the U. S. is derived from Brazil, which furnishes 75 per cent. of the whole import. It is known in commerce as "Rio." Coffee acts as a nervous stimulant, a property which it owes mainly to the alkaloid caffeine.

Coffee comes to the roasting factory in coarse gunny sacks, and is dumped into bins. In the factory are rows of iron roasters, in the interior portions of each one of which is a hollow cylinder with a capacity of several hundred pounds and filled with innumerable little holes. Underneath it a strong fire is kept burning. When the raw coffee has been placed in the cylinder, a shaft begins to revolve at a low rate of speed, turning the cylinder and thoroughly mixing the coffee. Each variety of coffee requires a different time for roasting and thus necessitates very experienced workmen in this process. When the coffee berries have swelled up and become just brown enough, the fire is shut off and the cylinders are emptied

and recharged. When the coffee is cool it goes to the packing room where it is shoveled into barrels, bales, sacks, and paper packages, ready for shipment.

**Coffer-dam**, a temporary wooden enclosure formed in water in order to obtain a firm and dry foundation for bridges, piers, etc. It is usually formed of two or more rows of piles driven close together, with clay packed in between the rows.

**Coffin**, the chest or box in which a dead body is enclosed for burial. Coffins were used by the ancients mostly to receive the bodies of persons of distinction. Among the Romans it was latterly the almost universal custom to consume the bodies with fire, and deposit the ashes in urns. In Egypt coffins seem to have been used in ancient times universally. They were of stone, earthenware, glass, wood, etc. A sort of ancient coffin is known as a sarcophagus. Coffins among Christians were introduced with the custom of burying. Modern coffins are usually made of wood, and are sometimes enclosed in a leaden case. It has recently been proposed to employ coffins of wicker work.

**Cognac** (kon-yak), a town in France, dep. Charente and near the river Charente, 22 mi. w. Angoulême pleasantly situated on a hill, crowned by the remains of an old castle. It is famous for the brandy which bears its name. and which is exported to all parts of the world. Pop. 17,392.

**Cogno'vit**, in law, is a written confession given by the defendant that the action of the plaintiff is just, or that he has no available defense.

**Cohesion Figures**, a class of figures produced by the attraction of liquids for other liquids or solids with which they are in contact, and divided into surface, submersion, breath, and electric, cohesion figures. Thus a drop of an independent liquid, as oil or alcohol, will spread itself out on the surface of water always in a definite figure, but differing with each fluid dropped on the water. Breath figures are produced by putting a drop of the liquid to be examined on a slip of mica, and breathing on it, when each fluid takes a distinct characteristic shape. Electric cohesion figures are produced by electrifying drops of various liquids placed on a plate of glass.

liquids placed on a plate of glass. **Cohoes**, Albany co., N. Y., on Hudson River, at the mouth of the Mohawk River and Erie Canal. It has the Del. & Hud. Canal Co., the N. Y. C. & H. R. railroads. Industries: colton mills, knitting mills, tube works, rolling mills, ax factories, foundries, and machine shops. Pop. est. 1897, 25,000.

**Coimbatore**, a town of Hindustan, Madras presidency, capital of district to which it gives name. Pop. 46,383. The district has an area of 7,860 sq. mi. It is fertile, producing sugar. cotton, rice, and tobacco; and well watered by several rivers. Pop. 2,004,839.

**Colmbra** (ko-im 'brå), a city of Portugal, province of Beira. It contains an old and a new cathedral, a hospital, and a university which is the only one in the kingdom. Manufactures: linen. pottery, articles of horn. The

environs produce oil, wine, lemons, and oranges of excellent quality. Pop. 51,226.

Coining, the art of converting pieces of metal into current coins for the purposes of commerce, usually performed in a government establishment called a mint. It is one of the prerogatives of the supreme power in all states, and counterfeiting or otherwise tampering with the coin is severely punished. In the U.S. the Bureau of the Mint was established as a division of the Treasury Department in 1873. It has charge of the coinage for the government and makes assays of precious metals for private owners. The rolling machines are four in number. The rollers are adjustable, and the space between them is governed by the operator. About 200 ingots are run through per hour on each pair of rollers. When the rolling is completed the strip is about 6 ft. long. As it is impossible to roll perfectly true it is necessary to "draw" these strips, after being softened by annealing. The drawing benches resemble long tables. with a bench on either side, at one end of which is an iron box secured to the table. In this are fastened two perpendicular steel cylinders. These are at the same distance apart that the thickness of the strip is required to be. It is drawn between the cylinders, which reduces the whole to an equal thickness. These strips are now taken to the cut-ting machines, each of which will cut 225 planchets per minute. The press now used consists of a vertical steel punch. From a strip worth \$1,100 about \$800 of planchets will be cut. These are then removed to the adjusting room, where they are adjusted. After inspection they are weighed on very accurate scales. If a planchet is too heavy, but near the weight, it is filed off at the edges; if too heavy for filing, it is thrown aside with the light ones to be remelted. The planchets, after being adjusted, are taken to the coining and milling rooms, and are passed through the milling machine. The planchets are fed to this machine through an upright tube, and as they descend are caught upon the edge of a revolving wheel and carried about a quarter of a revolution, during which the edge is compressed and forced up. By this apparatus 560 half dimes can be milled in a minute; for large pieces the average is 120. The massive but delicate coining presses coin from 80 to 100 pieces a minute. These presses are attended by women. After being stamped the coins are taken to the coiner's room. The light and heavy coins are kept separate in coining, and when delivered to the treasurer they are mixed in such proportions as to give him full weight in every delivery. By law, the deviation from the standard weight, in delivering to him, must not exceed three pennyweights in 1,000 double eagles.

**Coir**, cocoanut fiber, fiber from the husk of the nut, from which are manufactured matting, bagging, ropes, and cables. Coir cordage, from lasting well in salt water, as also from its lightness, strength, and elasticity, is preferable in many respects to ropes of hemp. Mats and matting are now largely made of coir, which is also used in coarse brushes, for stuffing purposes, etc.

**Coke**, the carbonaceous residue of coal which has been heated in an oven or retort, or in any way by which little air is admitted, until all volatile matter has been expelled. The simvolatile matter has been expelled. plest method of producing coke is based on the preparation of wood charcoal, the coal being arranged in heaps, which are smothered with clay or coal dust, and then set on fire, sufficient air being admitted to keep the mass at the proper temperature for decomposition without After the volatile portions wasting the coke. are got rid of, the heap is allowed to cool, or is extinguished with water, and the coke is then ready. Methods of heating the coal in close or open ovens until the gaseous and fluid products are driven off are also commonly used. Gas coke is that which remains in the retorts after the gas has been given off. Good oven coke has an iron-gray color, sub-metallic luster, is hard, and somewhat vesicular; but gas coke has rather a slagged and cindery look, and is more porous. Coke contains about 90 per cent. of carbon, and is used where a strong heat is wanted without smoke and flame, and it is accordingly largely consumed in drying malt and similar purposes. It used to be burned regularly in locomotive engines, but raw coal is now commonly substituted. The largest quantities are consumed in smelting operations

**Coke**, SIR EDWARD (1551-1634), an eminent English lawyer. He was chosen recorder of the cities of Norwich and of Coventry, knight of the shire for his county, and, in spite of the rivalship of Bacon, attorney general. As such he conducted the prosecutions for the crown in all great state cases. In 1013 he became chief justice of the Court of King's Bench. In 1621 he was committed to the Tower, and soon after expelled from the privy council. In 1628 he was chosen member for Buckinghamshire. On the dissolution of the Parliament he retired to his seat in Buckinghamshire, where he died. His principal works are legal text books of the highest value.

**Colberg** (or Kolberg), a Prussian fortified seaport in Pomerania. Pop. 16,027.

**Colbert** (kol-bār), JEAN BAPTISTE (1619-1683), a celebrated French minister of finances. He was made intendant, and at length comptroller general of the finances. He instituted many reforms.

**Colburn,** ZERAH (1804-1840), "the calculating boy," b. in Vermont. Before his sixth year he began to manifest wonderful powers of arithmetical computation, and in public exhibitions astounded learned mathematicians by the rapidity and accuracy of his processes, but the faculty left him when he grew up. After acting as a teacher and itinerant preacher, he was latterly professor of languages at Norwich University, Vermont.

**Col' chester**, a borough of England, county Essex. It has a good coasting trade and employs a great number of small craft in the oyster fishery. It is a place of high antiquity. there being no place in the kingdom where so great a quantity and variety of Roman remains have been found as here. Pop. 34.559.

Colchicum (kol'chikum), a genus of plants, allied to the lilies. The meadow saffron is a bulbous-rooted, stem-less, perennial plant, which grows in various parts of Europe. From a small corm or bulb buried about 6 in. deep, and covered with a brittle brown skin, there rises in the early autumn a tuft of flowers having much the appearance of crocuses, flesh-colored, white, or even variegated. They soon wither, and the plant disappears till the succeeding spring, when some broad leaves are thrown up by each corm along with a triangular oblong seed-vessel. The plant is acrid and poisonous



Cold Cream, a cooling ointment prepared in various ways. A good variety may be made by heating four parts of olive oil with one of white wax. This ointment cools the skin, rendering it soft and pliable,

Colden, CADWALLADER (1688-1776), colonial physician, b. in Dunn, Scotland. In 1708 he came to this country and practised medicine in Philadelphia until 1715, when he visited Scotland, and returned to Philadelphia in 1716. In 1718 he removed to New York, and obtained a patent for land near Newburg. In 1719, he became the first surveyor general of the province, and master in chancery. He was appointed a member of the council in 1720, and was a Royalist, and an advocate of the taxation of the colonies. In 1760, he was made president of the council, and, in 1761, lieutenant governor, which office he held until his death.

Coldwater, Branch co., Mich., on Cold-water River, 87 mi. from Toledo. Railroad, L. S. & M. S. Industries: numerous mills and It is the site of the state public factories. school. Pop. est. 1897, 6.000.

Cole, THOMAS (1801-1848), landscape-painter. He was b. in England, but was taken quite young to America. Among his works are the Voyage of Life, Course of Empire, Hunter's Return, Views in the White Mountains, etc.

**Coleop'tera**, an order of insects, commonly known as *beetles*. They have four wings, of which the two superior are not suited to flight, but form a covering and protection to the two inferior, and are of a hard and horny or parch-ment-like nature. The inferior wings, when not in use, are folded transversely under the superior. The coleoptera undergo a perfect metamorphosis. The larva generally resembles a short thick worm with six legs and a scaly head and mouth.

**Coleraine** (kol-ran'), a town, Ireland, county of Londonderry, 47 mi. n.w. of Belfast. Its trade, chiefly in linen, agricultural produce, and provisions, is considerable. Pop. 6,845.

**Coleridge**, the name of an English family famous in literature and law. The most distinguished of its members were Hartley Coleridge (1796-1849), Henry Nelson Coleridge (1800-1843), and the poet Samuel Taylor Cole-ridge (1772-1834). The latter was b. at Ottery St. Mary, Devonshire, of which his father was vicar. From Christ's Church he went with a scholarship to Jesus College, Cambridge, where he remained for two years. In 1795 he was married to Miss Fricket of Bristol. In 1796 he took a cottage at Nether Stowey, in Somersetshire, where he wrote much of his best poetry. While residing at Nether Stowey he used to officiate in a Unitarian chapel at Taunton, and in 1798 received an invitation to take the charge of a congregation of this denomination at Shrewsbury. Later he made a trip to Germany, where he studied at the Uni-Southey at Keswick, while Wordsworth lived at Grasmere in the same neighborhood. From this fact, and a certain common vein in their poetry, arose the epithet of "Lake School" applied to their works. About 1804 Coleridge went to Malta to re-establish his health, seriously impaired by opium-eating. In 1806 he returned to England, and after ten years of somewhat desultory literary work as lecturer, contributor to periodicals, etc., Coleridge took refuge from the world in the house of a friend at Highgate, London. Here he passed the rest of his days.

Colfax, Schuyler (1823-1885), American statesman. b. in New York City. He entered Congress in 1854 and served until March, 1869. From Dec. 7, 1863, to March 4, 1869, he was speaker of the house. He was elected vice president of the U.S. in 1868.

Coligny (kol-in-yē), GASPARD DE (1517-1572), He was made admiral of French admiral. France in 1552 On the night of St. Bartholomew's, Coligny was basely slaughtered.

Colima (ko-lē' mā), a town of Mexico, capital of the state of same name, situated in a fertile plain encircled by hills above which rises the lofty volcano of Colima. Pop. about 25,736. On the coast about 30 mi. s.s.w. of the city is the port, Puerto de Colima, or Manzanillo. The state has an area of 2,272 mi.; pop. 73,026.

Col'lege, in a general sense, a body or society of persons invested with certain powers and rights, performing certain duties, or engaged in some common employment or pursuit. In the U.S. and England some societies of physicians are called colleges. The most physicians are called colleges. The most familiar application of the term college, however, is to a society of persons engaged in

# **College Fraternities**

the pursuits of literature, including the professors, lecturers, or other officers, and the students. As applied to an educational institution the name is somewhat loosely used. The higher class of colleges are those in which the students engage in study for the purpose of taking a degree in arts, medicine, or other subjects, and are connected with, or have more or less the character of, universities. The early history of these institutions is somewhat obscure; the probability is that they were originally founded in the various universities of the Middle Ages, with similar objects and from the same charitable motives. Hostels or boarding houses were provided (principally by the religious orders for the benefit of those of their own fraternity), in which the scholars lived under a certain superintendence, and the endowment of these hostels by charitable persons for the support of poor scholars completed the foundation of a college. Out of this has developed the modern college of which there are about 500 in the **U.** S.

College Fraternities, or "Greek letter" societies, as they are often called, are organizations of students in colleges and universities of the U.S. They receive their names from two or more letters of the Greek alphabet, as Delta Kappa Epsilon. Each of these letters is the beginning of a word of the secret motto of the fraternity. The purpose of such societies is literary and social. A fraternity is made up of several chapters in various colleges through-out the Union. Each fraternity has a general government and holds conventions either an-nually or bi-annually. There are also some local fraternities which have but one chapter. The number of chapters in various fraternities varies from four to seventy-five. There are several professional fraternities, as medical, law, and dental fraternities, etc. There are several similar organizations of young women known as sororities. The first fraternity formed was *Phi Beta Kappa*, now an honorary fra-ternity. This was founded at William and Mary's College, Va., in 1776. There are at present over a hundred college fraternities in the U.S. Among the earliest fraternities the U. S. Among the earliest fraternites founded after the *Phi Beta Kappa*, were *Alpha Delta Phi* in 1832, at Hamilton College, N. Y.; *Kappa Alpha* in 1835, at Union College, N. Y.; *Beta Theta Pi* at Miami College, O.; *Delta Kappa Epsilon* in 1844, at Yale; *Psi Upsilon* in 1833, at Union College, N. Y. College Point Oppose co. N. Y. on Long

**College Point,** Queens co., N. Y., on Long Island Sound, 3 mi. n. of Flushing. Railroad, Long Island. It has some manufactures, principally of india-rubber goods. Pop. est. 1897, 5,000.

**Collie**, a variety of dog especially common in Scotland, and from its intelligence of much use to shepherds. It is of medium size and varies much in coloring, black and white being common, and black with tan-colored legs, muzzle, etc., being highly esteemed. The head is somewhat fox-shaped, the ears erect, but with drooping points, the tail rather bushy, and with a strong curl. **Col'lier, JEREMY** (1650-1726), English divine and political writer. He obtained the rectory of Ampton in Suffolk in 1659. He is chiefly remembered now for his *Short View of the Immorality and Profaneness of the English Stage*—a work of some merit which is said to have effected a decided reform in the sentiments and language of the theater.

**Collier**, JOHN PAYNE (1789-1883), English Shakespearian critic. In 1831 his best work, the *History of English Dramatic Poetry*, was published. In 1842-44 he published an annotated edition of Shakespeare in 8 vols.; in 1844 Shakespeare's Library.

**Collimation,** LINE OF, in an astronomical instrument, such as a telescope or transit instrument, the straight line which passes through the center of the object glass and intersects at right angles a system of spider threads placed at the focus of the eye piece. The proper adjustment of the line of collimation of the instrument is necessary to accurate observation of the time at which movements of the heavenly bodies take place.

**Collins**, WILLIAM (1721-1759), English poet. While studying at Oxford he wrote his *Oriental Ecloques*. In 1746 he published his *Odes*.



#### Collie.

**Collins**, WILLIAM WILKIE (1824-1889), a noted British novelist. Among his best known works are Antonina, Basil, After Dark, The Woman in White, The New Magdalen, The Eril Genius, etc.

**Collo'dion**, a substance prepared by dissolving pyroxiline (gun cotton) in ether, or in a mixture of ether and alcohol, which forms a useful substitute for adhesive plaster in the case of slight wounds. When the fluid solution is applied to the cut or wound it immediately dries into a semitransparent, tenacious film, which adheres firmly to the part, and under it the wound or abrasion heals without inflammation. In a slightly modified form collodion is also employed as the basis of a photographic process called the collodion process.

Collyer, ROBERT, Unitarian clergyman, b. in

### Colmar

England, 1823. He attended a night school for two winters, and, at the age of fourteen, was apprenticed to a blacksmith. In 1850 hecame to this country and worked as a hammer maker in Shoemakertown, Pa., and preached on Sundays. In 1860 he organized Unity Church, of Chicago, of which he was the pastor until 1879, when he removed to New York to assume charge of the Church of the Messiah, which post he still (1897) holds.

**Col'mar** (or Kolmar), a city of Germany, in Upper Alsace, formerly in the French department of Haut Rhin, 39 mi. s.s.w. Strassburg. It has manufactures of printed goods, calicoes, silks, etc., besides cotton mills, tanneries, etc. It was united to France in 1697 by the Peace of Ryswick, and surrendered to Germany by the Treaty of Versailles, Feb, 26, 1871. Pop. 30,399.

**Coloca'sia**, a genus of plants, nat. order Arceæ, the leaves and tuber of which are acrid. The latter contain much starchy matter, and they are used as food in the south of Europe after the acrid matter is separated by washing or boiling.

**Cologne** (ko·lõn'), a city of Rhenish Prussia, on the left bank of the Rhine, forming, in connection with Deutz, a fortress of the first rank. The old fortifications, dating from the Middle Ages, are being, or have been recently, swept away, new works being constructed. There are many fine old buildings as well as excellent modern ones; the churches in particular are interesting. The most important edifice of all is the cathedral, begun in 1248, one of the finest and largest Gothic structures in Europe. The manufactures embrace sugar, tobacco, glue, carpets, leather, machinery, chemicals, pianos, and the celebrated eau de Cologne. The trade is very great. Pop. 161,401.

**Cologne Yellow**, a pigment consisting of 2 parts yellow chromate of lead, 1 of sulphate of lead, and 7 of sulphate of lime or gypsum. It is prepared by precipitating a mixture of nitrate of lead and nitrate of lime with sulphate of soda and chromate of potash.

Colom bia, REPUBLIC OF, formerly called New Granada, a republic of South America, consisting of nine departments or states of Antioquia, Bolivar, Boyaca, Cauca, Cundi-namarca, Magdalena, Panama (or Istmo), Santander, and Tolima. Pop. 3,907,524. The chief towns are Bogota, the capital, Medellin, and Panama. The territory of the republic includes the whole of the Isthmus of Panama, to the borders of Costa Rica, the Pacific coast south to Ecuador, and that of the Caribbean Sea east to Venezuela; but there is much disputed boundary territory in the inland regions toward the south and east. The area is estimated officially at 504,773 sq. mi. According to surface conformation the country may be divided into the elevated region of the Cordilleras in the west, and that of the low-lying lands in the east. The former occupies the greater portion of the country and presents a richly-diversified surface, being formed chiefly of three mountain chains which stretch north

and south in a nearly parallel direction, enclosing between them the valleys of the rivers Cauca and Magdalena. These, the two great navigable rivers of the country, flow northward, joining their waters about 120 mi. from their embouchure in the Caribbean Sea. In the central ridge is the culminating point of Colombia, the volcano of Tolima, 18,315 ft. high. The low lands of the east form a transitionary region between the plains of North Brazil and the llanos of the Orinoco region, the drainage being carried to the Amazon and Orinoco. The chief coast indentations are the Gulfs of Panama and Darien. The climate is naturally as varied as the surface of the country, but over a great part of the republic is very hot. At Cartagena on the Caribbean Sea, and on the Pacific coast, yellow fever is endemic at some places: while on the elevated country, as the plain of Bogota, 8,000 ft. above the sea, the climate is perfectly salubrious, and the temperature seems that of eternal spring. The flora is rich and luxuriant. A great part of the country is still covered with virgin forests, which yield excellent building wood, Peruvian bark, caoutchouc, vanilla, etc. The fauna includes the jaguar, puma, tapir, armadillo, sloth, various species of deer, and the gigantic condor. The mineral wealth is various and abundant. It comprises coal, gold, silver, emeralds, and salt. Industry is at a very low stage. Maize, bananas, and plantains are the chief articles of food. Tobacco and coffee are cultivated and exported. Sugar is also grown. Manufactures can scarcely be said to exist, Panama hats, mats, and coarse cotton cloths being almost the only articles that can be mentioned in this class. The chief ports are Barranquilla, Cartagena, Colon, and Panama. The possession of the Isthmus of Panama and the small line of railway (48 mi. long) which runs between Panama on the Pacific and Aspinwall on the Atlantic gives Colombia considerable commercial importance, which is likely to be increased by the canalization of the isthmus, if this is ever completed. The foreign trade is chiefly with Britain and the U.S. The exports are chiefly precious metals, hides, coffee, tobacco, etc.; the imports, manufactured goods. There are several short lines of railway. The money standard is the pese or dollar, nominal value \$1. dollar, nominal value \$1. By the consti-tution, as amended in 1886, the executive power is vested in a president elected for six years, the legislative power in a congress of two houses - the senate and the house of representatives. The former consists of 27 representatives, 3 from each department, and 6 members nominated by the president; the latter, of representatives elected for four years. one for every 50,000 inhabitants. The revenue is generally under the expenditure and the finances are in an unsatisfactory state. New Granada was discovered by Alonso de Ojeda in 1499: it was visited by Columbus on his fourth voyage, in 1502. The first Spanish settlement was made in 1510 at Santa Maria in the Gulf of Darien, and the whole country

# Colombo

was formed into a province under a captain general in 1547. New Granada declared its independence of Spain in 1811, and after eleven years of warfare succeeded with the help of Venezuela in effecting its liberation. Both states then united with Ecuador, also freed from the Spanish domination, to form the first republic of Colombia; but internal dissensions arising, the three states again separated in 1831, forming three independent republics, which have had a very troubled existence. In 1861 the states forming New Granada by agreement adopted a new constitution, the republic henceforth to be called the United States of Colombia. This title was retained till, by the new constitution adopted in 1886, the state ceased to be a federal republic and became a unitary republic with the name of Republic of Colombia. Its recent history has presented a series of civil broils.

**Colom'bo**, a seaport town, the capital of Ceylon, on the southwest coast, and about 70 mi. w. by s. of Kandy, with which it is connected by railway. The public buildings comprise the government offices, government house, supreme court, museum, etc. Through the construction of a breakwater and other works there is now excellent harbor accommodation; and numerous vessels call here. Pop. 126,825.

**Colon'**, (or Aspinwall) (the former is the official name), a free port of Colombia, on Manzanillo Island, on the north side of the Isthmus of Panama, at the Atlantic extremity of the interoceanic railway, and near that of the Panama Canal. Established in connection with the railway, it had an important transit trade before the canal was begun, and since then the place has been entirely transformed, a new town with wide and regular streets having been built on a tract of land reclaimed by the Canal Company. There is extensive harbor accommodation. Pop. 10,956.

**Colon' na**, an Italian family that had become important as early as the eighth century. Its fame during the Middle Ages eclipsed that of every other Roman family except the great rival house of the Orsini. The Colonna family is at present represented by several branches, the Colonna-Sciarra, Colonna-Stigliano, etc. It played an important part in the affairs of Europe, became allied to the greatest houses of Italy, Spain, and Germany, and has furnished many celebrated warriors, popes, and cardinals.

**Colon'na**, CAPE. the southern extremity of Attica, Greece. Its summit is crowned by the ruins of a temple of Athena 269 ft. above the sea, of which sixteen columns of white marble are still standing.

**Colon'na**, VITTORIA (1490-1547), the most renowned poetess of Italy, was the daughter of Fabrizio Colonna, high coustable of Naples. At the age of seventeen she was married to Ferdinand, Marquis of Pescara, who became one of the distinguished men of his age. All her poems were devoted to the memory of her husband. Her most celebrated work is the *Rime Spirituali*.

## Colony

Col'ony, a settlement formed in one country by the inhabitants of another. Colonies may either be formed in dependence on the mother country or in independence. In the latter case the name of the colony is retained only in a historical sense. Properly, perhaps, the term should be limited to a settlement which carries on a direct cultivation of the soil, as in the Dominion of Canada or Australia; such settlements as those of the British in Hindustan or Malta being the mere superposition on the natives of a ruling race which takes little or no part in the general industry of the countrv. Sometimes the ambition of extending territory and the desire of increasing wealth have been the chief impulses in colonization; but colonies may now be said to have become a necessity for the redundant population of European states. Among ancient nations the principal promoters of colonization were the Phœnicians, the Greeks, and the Romans; the greatest colonizers in modern times have been the English and the Spaniards, next to whom may be reckoned the Portuguese, the Dutch, and the French. The Germans have latterly contributed largely to the tide of emigration, particularly in the direction of America; but they have done little directly as colonizers. The Phoenician colonies were partly caused by political dissensions and redundant population, but were chiefly commercial, serving as entrepôts and ports of repair for Phœnician commerce along the coasts of Africa and Spain, in the latter of which they numbered, according to Strabo, more than two hundred. But it was in Africa that the most famous arose, Carthage, the greatest colonizing state of the ancient world. The Greek colonies, which were widely spread in Asia Minor and the islands of the Mediterranean, the coasts of Macedonia and Thrace, in South Italy and Sicily, were commonly independent, and frequently soon surpassed the mother states in power and importance. The colonies of Rome were chiefly military, and while the empire lasted were all in strict subordination to the central government. As the Roman power declined the remains of them amalgamated with the people among whom they were placed, thus forming in countries where they were sufficiently strong what are known as the Latin races, with languages (Spanish, Portuguese, French, and Italian) which are merely modi-Before fications of the old Roman tongue. America and the way by sea to the East Indies were discovered, the only colonies belonging to European states were those of the Genoese, Pisans, and Venetians in the Levant and the Black Sea, flourishing establishments on which the mercantile greatness of Italy in those days was largely built.

The *Portuguese* were the first great colonizers among modern states. In 1419 they discovered Madeira, the Azores, and the Cape Verd Islands; the Congo and the Cape of Good Hope followed; and before the century was out Vasco da Gama had landed at Calicut on the Malabar coast of India. The first Portuguese colonies were garrisons along the coast where they traded: Mozambique and Sofala on the east coast of Africa, Ormuz and Muscat in the Persian Gulf. Goa and Damao on the west coast of India. Colonies were established in Ceylon in 1505, in the Moluccas in 1510. Brazil was discovered in 1499, and this magnificent possession fell to Portugal, and was colonized about 1530. Bad government at home and the subjection of the country to Spain caused the loss of most of the Portuguese colonies. The Portuguese now possess several territories in Asia, at Goa, Damao, and Diu, India; Macao, China; and some is-lands in the Indian Archipelago. In Africa they possess the Cape Verd and other islands; settlements in Senegambia, Guinea, Mozambique, Sofala, Angola, Benguela, Mossamedes, formally amounting in area to about 700,000 sq. mi.; but Portuguese influence is really limited to a very small portion of this.

Soon after the Portuguese the Spaniards commenced the work of colonization. In 1492 Columbus, on board of a Spanish vessel, discovered the island of San Salvador. Hayti, or San Domingo, Porto Rico, Jamaica, and Cuba were soon colonized, and before the middle of the sixteenth century Mexico, Ecuador, Ven-ezuela, New Granada, Peru, and Chile were subdued, and Spain took the first rank among the colonizing powers of Europe. But the Spaniards never really attempted to develop the industrial resources of the subject coun-The pursuit of mining for gold or silver tries. occupied the colonists almost exclusively, and the enslaved natives were driven to work themselves to death in the mines. Cities were founded, at first along the coasts. for the sake of commerce and as military posts, afterward also in the interior, in particular in the vicinity of the mines, as Vera Cruz, Cumana, Porto Bello, Carthagena, Valencia, Caracas: Acapulco and Panama on the coast of the Pacific; Lima, Concepcion, and Buenos Ayres. The colonial intercourse with Spain was confined to the single port of Seville, afterward to that of Cadiz, from which two squadrons started annually-the galleons, about twelve in number, for Porto Bello; and the fleet, of fifteen large vessels, for Vera Cruz. When the power of Spain declined, the colonies soon took the opportunity to declare their independence, and thus were formed the republics of Mexico, Venezuela, Colombia, Ecuador, Peru, Bolivia, Chile, etc. Cuba, Porto Rico, the Philippine Islands, and a few other small places in India and Africa are now all that remain of the colonies of Spain.

The hate of Philip II, who prohibited Dutch vessels from the port of Lisbon, forced the Dutch to import directly from India or lose the large carrying trade they had acquired. Several companies were soon formed, and in 1602 they were united into one, the Dutch East India Company, with a monopoly of the East India trade and sovereign powers over all conquests and colonies in India. The Dutch now rapidly deprived the Portuguese of nearly all their East Indian territories. settled a colony at the Cape of Good Hope (1650), established a West India Company, made extensive con-

quests in Brazil (1623-60), which were soon lost, and more permanent ones on some of the smaller West India Islands, as San Eustatia, Curaçoa, Saba, etc. The growing power of the British and the loss of Holland's independence during the Napoleonic wars were heavy blows to the colonial power of the nation. But the Dutch still posses numer-ous colonies in the East Indies, among which the more important are Java, Sumatra, Dutch Borneo, the Molucca Islands, and part of New Guinea, also several small islands in the West Indies, and Surinam. No colonizing power of Europe has had a career of such uni-form prosperity as Great Britain. The English attempts at colonization began nearly at the same time with the Dutch. After many fruitless attempts to find a northeast or northwest passage to the East Indies, English vessels found their way round the Cape of Good Hope to the East Indies in 1591. The East India Company was established in 1600. English commerce with India, however, was not at first important, and they possessed only single factories on the continent up till the beginning of the eighteenth century. The ruin of the Mogul Empire in India after the death of Aurengzebe (1707) afforded the opportunity for the growth of British power, as the British and French were compelled to interfere in the contentions of the native princes and govern-The French appeared at first to maintain ors. the superiority; but the British in turn got the upper hand, and the victory of Clive at Plassey in 1756 laid the foundation of an exclusive British sovereignty in India. By the middle of the next century the British territory embraced, with the exception of a few dependent states, nearly the whole of India, and this vast territory was still under the government of the East India Company—a mercantile company, controlled indeed by Parliament, but exercising many of the most important functions of an independent sovereignty. On the suppres-sion of the Indian mutiny (1857-58) the government of India was transferred to the crown by act of Parliament in 1858.

The discoveries of the Cabots, following soon after the voyages of Columbus, gave the English crown a claim to North America, which though allowed to lie dormant for nearly a century, was never relinquished, and which, in the reign of Elizabeth, led to colonization on a large scale. Raleigh's settlement on Roanoke Island (North Carolina), in 1585, failed to become permanent, but in 1607 the colonists sent out by the London Company to Chesapeake Bay founded Jamestown, on the James River, in Virginia. The next great settlement was that of the Pilgrim Fathers, who landed Dec. 21, 1620, in Massachusetts Bay. The colonization of New Hampshire, Maine, New Jersey, Connecticut, Rhode Island soon followed. In the state of New York and the Hudson River territory the British found the Dutch already in possession, but in 1654 they seized the colony of New Amsterdam by force, changing its name to New York in honor of James, duke of York. Pennsylvania was

founded by William Penn, and colonized with Quakers in 1682; Maryland in 1631 by a party from Virginia; Carolina in 1670, and Georgia in 1732 by colonies from England. Colonies were early established in the West India Islands, including Barbadoes, half of St. Christopher's (1625), and soon after many smaller islands. Newfoundland was taken possession of in 1583, colonized in 1621 and 1633. Canada was surrendered to Britain at the peace of Paris, in 1763. In 1764 began the disputes between Britain and its North American colonies, which terminated with the acknowledgment of the independence of the U.S., Canada still remaining a British dependency.

Australia was discovered in the beginning of the seventeenth century. The first Australasian settlements of Britain were penal colonies. New South Wales, discovered in 1770, was established as a penal colony in 1788; Tasmania (Van Dieman's Land), discovered by Tasman in 1642, followed in 1803; West Australia, also first used as a penal settlement, became a free colony in 1829; Victoria (Port Philip) was colonized in 1835, and made an independent colony under its present name in 1851; South Australia was settled in 1836; New Zealand, discovered by Tasman in 1642, began to be used for whale fishery about 1790, was settled in 1839, and made a colony in 1840. In 1851 the discovery of the abundance of gold in Victoria ave a great impetus to the prosperity of the Australian colonies. In 1874 the Fiji Islands, and in 1884 part of New Guinea, were annexed as crown colonies. In South Africa Cape Colony. first settled by the Dutch in 1652, became an English colony in 1814. The latest annexations in this quarter are Griqualand West (1880), the Transkeian Territories (1875-84), Walfisch Bay (1884), and Bechuanaland (1885). Further north are the crown colonies-Lagos, the Niger Districts, the Gold Coast, Gambia, and Sierra Leone-all, except Lagos, which was acquired in 1861, ancient possessions of Britain. In Europe Great Britain has a few colonies acquired for military reasons-Gibraltar in 1704; Malta and Gozzo 1800, Heligoland 1807 (to Germany, 1890). It is estimated that the existing British colonies and dependencies embrace about one sixth of the land surface of the globe and nearly the same proportion of its population.

According to their government relations with the crown the colonies are arranged under three heads: 1, Crown colonies, in which the crown has the entire control of legislation, while the administration is carried on by public officers under the control of the home government. 2, Colonies possessing representative institutions but not responsible government, in which the crown has no more than a veto on legislation, but the home government retains the control of public officers. 3, Colonies possessing representative institutions and responsible government, in which the crown has only a veto on legislation, and the home government has no control over any officer except the governor. All colories are, however, disabled from such acts of independent sovereignty as the initiative in war, alliances, and diplomacy generally.

France was somewhat late in establishing colonies. Between 1627 and 1636 the West Indian islands of St. Christopher's, Guadeloupe, and Martinique were colonized by private persons. Champlain was the pioneer of the French in the exploration of the North American continent, and founded Quebec in 1608. Colbert purchased several West India Islands, as Martinique, Guadeloupe, St. Lucia, etc., and sent out colonists in 1664 to Cayenne. In 1670 the East India Company formed by Colbert founded Pondicherry, which became the capital of extensive possessions in the East Indies. At the beginning of the eighteenth century France had extensive settlements in Canada, Nova Scotia, and Newfoundland, the most flourishing of the West India Islands, and she seemed to have a prosperous career before her in India. Ere long, however, the rival interests of British and French colonists brought about a conflict which terminated in the loss of Canada and other North American possessions, as well as many of the West India Islands, while the dominion of India passed into the hands of the The chief colonial possessions of British. France at present are: in India, Pondicherry, and a few other small territories; Cochin-China, Tonquin, and the protectorates of Anam and Cambodia in Southeastern Asia; New Caledonia, the Loyalty and Marquesas Islands, etc., in Oceania; in Africa, Algeria, Tunis, Senegambia, island of Réunion, the protectorate of Madagascar, etc.; in America, Martinique, Gnadeloupe, St. Bartholomew, and Guyana. Algeria is now officially a French department.

Of recent years Germany has made an effort to take rank as a colonial power, and has acquired in Africa the territories of Damaraland and Luderitzland to the northward of Cape Colony, the Cameroons District, a considerable portion of territory formerly claimed by the sultan of Zanzibar, the Kilima-Njaro, the greater part of Somaliland, etc.; also in the Pacific a portion of New Guinea, now called Kaiser Wilhelm's Land, and the Bismarck Archipelago. Denmark's northern dependencies, Iceland, Greenland, and the Faroe Islands, though of considerable extent are of small value. In the West India Islands she has St. Thomas, settled in 1672; Santa Cruz, purchased from France in 1733; St. John; and some smaller islands.

**Col'ophon,** an ancient Ionian city of Asia Minor about 8 mi. n. of Ephesus, one of the places that claimed to be the birthplace of Homer. and the native city of Mimnermus, the elegiac poet, and of other eminent men.

**Colorado** (kol-o-rä'dō), one of the U. S. of America, situated in the central belt of states in the Rocky Mountains, and containing an area of 104,500 sq. mi. It is traversed from north to south by the main range of the Rocky Mountains, and forms a part of the region designated upon the early maps of the U. S. as the "Great American Desert." The plains east of the mountains constitute about one third of the total area. Among the elevated ranges are four large, natural parks the North, South, Middle, and San Luis—

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which form distinct, picturesque, and beautiful features of the mountain system, and are watered by numerous streams and covered with verdure. The San Luis park, situated in the southwestern division, is the only one of the series that is well adapted to agriculture, and the only one which has been peopled to any considerable extent. It is traversed from north to south by the Rio Grande River, has six towns, a mixed population of Americans and Mexicans, the whole numbering about 6,000. Sixteen thousand sq. mi. are covered by forests, chiefly yellow and white pine and spruce. None of the harder woods, except a few clusters of scrub oaks, worthless for anything but fuel, exist in Colorado. Four fifths of the state has an elevation of 4,000 to 10,000 ft. above the sea. The lowest on the eastern border is 3,703 ft., and on the western, 4,435. The mountain parks are 8,000 to 9,500 ft. above tide water. The summit of the main range averages 11,000 ft. Seventy-two peaks from which the snow never disappears, rise to heights between 13,500 and 14,500 ft. The loftiest of these is the Sierra Blanca, a part of the chain enclosing the San Luis park, 14,483 ft. high. The geographical center of Colorado is at a point 3 mi. n.n.e. of Spinney Station, on the Colorado Midland Railway, in Park The principal rivers on the eastern county. slope of the great mountains are the South Platte and the Arkansas; on the western, the Grand and the Gunnison, each re-enforced by innumerable tributaries from the melting snows. None are navigable. Here and there are beautiful fresh-water lakes, swarming with flsh.

Climate.—The climate of Colorado is remarkably heathful. The air is dry, clear, and well adapted to the cure of diseases of the lungs and throat, The annual range of temperature is much less than in other sections of the country. In the various parts it is about  $60^\circ$  F. and the highest temperature does not exceed  $80^\circ$  nor the lowest  $20^\circ$  below. Health resorts are numerous in the mountain regions and there are also mineral and thermal springs. The mean temperature at Denver is  $50^\circ$ .

The mean temperature at Denver is 50°. Vegetation.—The soil is fruitful and the climate is well adapted to the growth of cereals. The state is almost a treeless region, although there are a few trees in the river bottoms; these are cottonwood, box elder, scrub oak, pine, and spruce. The sides of the mountain up to the snow line are covered with pines of various kinds, spruce, and fir. These woods furnish the supply of lumber needed. There is a large supply of native grass in Colorado and this furnishes pasture for the large herds of cattle and sheep. Vegetables of all kinds and many fruits are successfully grown. The soil of the greater part of the state is very fruitful where it can have sufficient moisture. Irrigation is used to a great extent, and in such regions wheat, maize, barley, oats, hay, and po-tatoes are staple products. The proverbial "Colorado potato bug" has proved very de-structive to many crops. Cattle and sheep structive to many crops. raising are important industries. The value of the crops in 1892 was, corn, \$1,109,000; wheat, \$1,452,000; oats, \$964,200.

Minerals .- The chief industry of the state is mining, and in its yield of gold and silver it is the leading state of the Union. Nearly every known mineral is found within the state. There are thousands of mines which produce lodes of silver and gold. There are also large deposits of lead ores, and the state produces about 45 per cent. of the entire lead output of the whole country. One mine has been known to yield since its discovery about \$160,000,000. Since 1880 Colorado has produced about \$480,-000,000 of gold and silver. One of the richest gold fields in the world has recently been opened up in the Cripple Creek district. In various parts of the state are iron mines of a good quality. There are large supplies of copper, zinc, cement, silica, gypsum, onyx, and several valuable clays. There are many veins of anthracite and bituminous coal and nearly every town and city in the state has coal

within close range. Manufactures.—In manufacturing Colorado ranks as the 28th state of the Union, producing annually about \$70,000,000 worth of goods of various kinds. At the present time there are about 700 manufacturing establishments employing about 22,000 hands. The principal manufacturing industries are in connection with the mineral products of the state: they are brass works, lead works, machine shops, foundries, iron works, building materials, tin. copper works, flouring mills, and furniture.

copper works, flouring mills, and furniture. Railroads.—There are at present about 4,500 mi. of railroads. The first railroad was built in 1870 extending n. from Denver 106 mi. and connecting with the Union Pacific at Chevenne. Six trunk lines reach Denver from the Missouri River, and another extends from Denver to Fort Worth, Texas, forming a connection with lines to Galveston and New Orleans. The principal system is that of the Denver & Rio Grande which extends to Santa Fć, N. M., having lateral branches extending to all the important towns in the southern, southwestern, and western divisions of the state. There are also connecting lines between Denver and Salt Lake City.

Education.—Colorado has a state university, agricultural college, school of mines, state normal school, all of which are sustained by legislative appropriations. Other institutions of learning are Colorado College, University of Denver, Westminster University of Colorado, Presbyterian College of the Southwest, Longmont College, St. John's College, Jesuit College, etc. Since the admission of the state into the Union, over \$15,000,000 has been expended in the extension of the common school system. There are thirty public libraries in the state, with about 65,000 volumes.

History.—About half of the present state of Colorado was acquired from France in the Louisiana purchase; the remainder was obtained from Mexico under the Treaty of Guadalupe Hidalgo. It was organized as a territory in 1801 and became a state in 1876, and is commonly known as the Centennial State. The

### Colorado

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principal towns and cities are Denver, Aspen, Colorado Springs, Leadville, and Pueblo. Woman suffrage was adopted in the election of 1893 by a majority of over 4,000 votes. The new capitol building was completed in 1894 at a cost of \$2,250,000. In 1890 the population was 404,468 whites; 7,730 colored; 1,083 Indians, and 612 Chinese, making a total of 413,893. Since that time there has been a large increase in population owing to the discovery of the gold fields. In population the state ranks thirty-first in the Union.

Gorernors.—John L. Routt, 1876-79; Frederick W. Pitkin, 1879-83; James B. Grant, 1883-85; Benjamin H. Eaton, 1885-87; Alva Adams, 1887-89; Job A. Cooper, 1889-91; John L. Routt, 1891-93; Davis H. Waite, 1803-95; Albert W. McIntire, 1895-97; A. Adams, 1897.

**Colorado**, a name of two rivers of the U. S. — 1. The WESTERN COLORADO, (or Rio Colorado), formed by the junction of the Green and Grand rivers, in Utah. It flows s.w. and s. through Arizona, and between Arizona and Nevada and California, and after a total course, including Green River, of about 1,200 mi. falls into the Gulf of California. Among the most wonderful natural objects in North America is the Big Cañon of the Colorado. Here the river flows between walls of rock which are nearly vertical, and are in some places 6,000 ft. high. This cañon is more than 300 mi. long. 2, A river in Texas which rises in the n.w. part of the state, flows generally s.e., and after a course of about 900 mi. falls into the Gulf of Mexico at the town of Matagordo.

**Colorado**, Mitchell co., Tex., on Colorado River, 230 mi. w. of Fort Worth. Railroads: Texas & Pacific: and Colorado Valley. Industries: salt works, wool scouring mills, ice plant, and rolling works. Surrounding country agricultural and grazing. The town was first settled in 1876 and became a city in 1882. Pop. est., 1897, 1,800.

**Colorado Beetle**, an American species of beetle, nearly half an inch in length, almost oval, of a yellowish color marked with black spots and blotches, and on the elytra with ten black longitudinal stripes. The wings are of a blood-red color. It works great havoc among the potato crops.

**Colorado Springs,** El Paso co., Colo., 75 mi. s. of Denver. Railroads: D. & R. G.; C. R. I. & P.; Denver & Gulf; A. T. & S. F.; and Colorado Midland. It is a popular health resort and situated only ten miles from Pike's Peak. Colorado College is located there. The town was first settled in 1871. Pop. est., 1897, 20,000.

**Collos' sæ**, an ancient city of Asia Minor, in Phrygia, on the Lycus, a branch of the Mæander. It was the seat of one of the early churches of Asia to whom the apostle Paul wrote about 62 or 63 A. D.

**Colosse'um**, a name given to the Flavian Amphitheater in Rome, a large edifice for gladiatorial combats, fights of wild beasts, and similar sports. It was begun by Vespasian, and finished by Titus 80 A. D. The outline of the Colosseum is elliptic, the exterior length of the building being 620 and its breadth 513 ft.; it is pierced with eighty openings or vomitaria in the ground story, over which are superimposed three other stories, the whole rising perpendicularly to the height of 160 ft. Although two thirds of the original building have disappeared it is still a wonderful structure.

Colos'sus, in sculpture, a statue of enormous magnitude. The Asiatics, the Egyptians, and in particular the Greeks, have excelled in these works. The most celebrated Egyptian colossus was the vocal statue of Memnon, in the plain of Thebes, supposed to be identical with the most northerly of two existing colossi (60 ft. high) on the west bank of the Nile. Among the colossi of Greece the most cele-brated was the colossus of Rhodes, a brass statue of Apollo 70 cubits high, esteemed one of the wonders of the world, erected at the port of Rhodes by Chares, 290 or 288 B. c. It was thrown down by an earthquake about 224 B. C. The statue was in ruins for nearly nine centuries, when the Saracens, taking Rhodes, sold the metal, weighing 720,900 lbs., to a Jew, about 653. There is no authority for the popularly-received statement that it bestrode the harbor mouth, and that the Rhodian vessels could pass under its legs. Among the colossi of Phidias were the Olympian Zeus and the Athena of the Parthenon; the former 60 ft. high and the latter 40. The most famous of the Roman colossi were the Jupiter of the Capitol, the Apollo of the Palatine Library, and the statue of Nero, 112 or 120 ft. high, and from which the contiguous amphitheater derived its name of Colosseum. Recently rock-cut statues have been measured at Bamian on the road between Cabul and Balkh, the largest being 173 ft. high and the second 120 ft.

Among modern works of this nature is the colossus of San Carlo Borromete; at Arona, in the Milanese territory, 60 ft. in height; the Bavaria at Munich, 65 ft. high; the statue of Hermann or Arminius near Detmold, erected in 1875, 90 ft. in height to the point of the upraised sword, which itself is 24 ft. in length; the height of the figure to the point of the helmet being 55 ft.: the statue of Germania, erected in 1883 near Rüdesheim, a figure 34 ft. high, placed on an elaborately-sculptured pedestal over 81 ft. high; and Bartholdi's statue of Liberty presented to the U.S. by the French nation, and which measures 104 ft., or to the extremity of the torch in the hand of the figure 138 ft. It is erected at New York harbor on a pedestal 114 ft., is constructed for a light-house with one of the most powerful fixed lights in the world, and stands 317 ft. above mean tide.

**Color** is the name given to distinguish the various sensations that lights of various rates of vibration give to the eye. As is the case with many of the words that denote our sensations, the word *color* is also applied to the properties of bodies that cause them to emit the light that thus affects our senses. The molecular constitution of a body determines

the character and number of the light vibrations it returns to the eye, and so gives to each body its own characteristic color; hence the term color is used to denote that in respect of which bodies have a different appearance to the eye independently of their form.

Ordinary white light (the light which comes from an incandescent solid or liquid) when transmitted through triangular prisms of glass or other media differing in dispersive power from the atmosphere, is shown to consist of a number of colored lights, which, meeting the eye, together produce the sensation of white The colors thus shown are usually light. said to be seven-red, orange, yellow, green, blue, indigo, violet; although in reality there is an enormous, if not an infinite number of perfectly distinct colors in light. The seven colors are frequently called the primary colors, and other tints and shades are producible by mixing them; but in a stricter sense the primary colors are three in number, namely, red, green, and violet (or blue). These three colors or kinds of light cannot be resolved into any others. In the scientific sense of the word white and black are not considered colors, a white body reflecting and a black body absorbing all the rays of light without separating them, whereas the colors proper are due to separation of the rays of light by partial absorption and reflection or by refraction. If a body absorbs every other kind of light and reflects or transmits red light only, it will appear of a red color; if it absorbs every kind except blue rays, it will appear blue; and so on. If more than one kind of light be transmitted or reflected the object will appear of a color compounded of these different rays of light.

In art the term color is applied to that combination or modification of tints which produces a particular and desired effect in painting. The colors of the spectrum have to be distinguished from color used in reference to pigments. The pigments red, blue, and yellow, regarded in the arts as the primary colors, produce effects when mixed, very different from those produced by admixture of the corre-sponding spectrum colors. These three pigment colors form other colors thus: red and yellow make orange, yellow and blue make green, and red and blue make purple; but red, blue, and yellow cannot be produced by any combination of the other colors. *Local colors* are those which are natural to a particular object in a picture, and by which it is distinguished from other objects. Neutral colors, those in which the hue is broken by partaking of the reflected colors of the objects which surround them. Positive colors, those which are unbroken by such accidents as affect neutral Complementary colors, colors which objects. together make white; thus any of the primary colors is complementary to the other two. Subjective or accidental colors, the imaginary complementary colors seen after fixing the eye for a short time on a bright-colored object, and then turning it suddenly to a white or lightcolored surface.

Color Printing, the art of producing pic-

tures, designs, cards, etc., in various colors by means of lithography, printing from metal blocks, etc. The ordinary methods are: 1, The chromo-lithographic, in which a tracing of the original picture, or the like, is first made, and a copy transferred to as many stones as there are colors in the original, every color requiring a fresh stone. The drawing on each stone is made to fit in, or register, with the preceding one, and as the paper passes through the machine an additional color is added every time, and thus the picture is built up color upon color (each being allowed to dry before the next is put on) until it is completed. Some chromos or oleographs may have as many as 25 or 30 printings or colors. 2, Block or surface color printing is specially adapted for book illustrations or similar work where nicety of detail or rapidity of production is required. As in chromo-lithography various printings are necessary; but these. while producing similar effects, are reduced in number by a method of printing several tints of the same color at one operation. Each block, which is usually of zinc and prepared in the usual way, is capable of producing three or more gradations of the same color: the darkest shade from the normal surface. lighter shades being got from parts which have been bitten or corroded in an almost imperceptible degree-the deeper corrosions giving, of course, the lightest shade. When all the tints of one color are thus printed from one block and in one operation, a second block with gradations, in the same way, is used. registering as in chromo-lithography, and so on until the picture is finished.

**Coltsfoot**, a weed of the order Compositæ. the leaves of which were once much employed as a remedy for asthma and coughs. The name is given from the leaf somewhat resembling the foot of a colt, being broad and heartshaped; the flowers are yellow.

**Col' uber**, a genus of non-venomous serpents, which includes several North American snakes. To the same family belongs the common ringed snake which attains a length of 3 or 4 ft.

**Colum' ba,** Sr. (521-597), a native of Ireland. In 545 he founded the monastery of Derry. About 563 he landed in the island of Hy, now called Iona, and founded his church. About 565 he went on a mission of conversion among the northern Picts, and traversed the whole of Northern Scotland preaching. Shortly before his death he revisited Ireland.

**Columbia**, DISTRICT OF, a portion of the U.S. containing the national capital, is bounded on the w. by the Potomac River and on all other sides by Maryland. It contains the cities of Washington and Georgetown and has an area of 64 sq. mi. The seat of government was moved here from Philadelphia in 1900, and in 1814, the Capitol, White House, and executive buildings were burned by the British. The control of the government of the district is in charge of three commissioners appointed by the president. These have power to make appointments to all offices in the cities and district. Among institutions of note outside the

capital are, the Soldiers' Home, the Columbia Institute for the Deaf and Dumb, and the government hospital for the insane. Pop. est. 1890, 230,392. See *Washington*.

**Columbia**, Richland co., S. C., 130 mi. n.w. of Charleston on the Congagree River; the state capital. Railroads: Junc. Rich. & Danv., and others. Seat of the University of South Carolina, the Ursuline Institute (Catholic), a state insane asylum, etc. Center of a rich agricultural and forest district. Pop. est. 1897, 15,950.

**Columbia**, Lancaster co., Pa., on Susquehanna River, 12 mi. w. of Lancaster. Railroads: P. R. R.; Reading & Columbia; Columbia & Port Deposit, Frederick div. Industries: silk mills, several iron foundries, flour mill, iron mills, stove works, and lace mills. Surrounding country mineral and agricultural. The town was first settled in 1726 and is still a borough. Pop. est. 1897, 13,000.

**Columbia**, Maury co., Tenn., on Duck River, 45 mi. s. of Nashville. Railroads: N. C. & St. L.; L. & N.. and N. F. & Sheffield. Industries: cotton mills, two flouring mills, three lumber and planing mills, and a pump factory. Surrounding country is agricultural and mineral, and is in the blue grass region of Tenn. The town was first settled in 1807. Pop. est. 1897, 7,000.

**Columbia College**, a distinguished educational institution in New York, established in 1746, and giving a course of instruction in literature, divinity, science, medicine, law, and mining.

**Columbia River** (or Oregon), a river of the U. S. flowing into the Pacific Ocean, and rising at the base of the Rocky Mountains in British Columbia. It has a very winding course partly in British Columbia but mainly in the U. S., where it receives two large tributaries, Clark's River and Snake River. Latterly it turns abruptly to the west and forms the boundary between Washington and Oregon. It drains an area of 298,000 sq. mi., and has a length of about 1.400 mi.

**Columbian Exposition**, created by act of Congress of April 25, 1800, providing for celebrating the 400th anniversary of the discovery of America by Columbus. See *World's Colum*bian Exposition.

**Col'umbine**, the popular name of plants with five colored sepals and five spurred petals. The common columbine is a favorite garden flower, and owes its name to the fancied resemblance of the petals to the form of pigeons.

**Columbus**, Muscogee co., Ga., on left bank of Chattahoochee River, 100 mi. s.s.w. of Atlanta. Railroads: Central of Georgia; Georgia Midland & Gulf; and Southwestern. Principal industries are large cotton mills, iron works, plow, barrel, and bagging factories, and many smaller industries. The export trade in cotton is very large. Surrounding country agricultural. Pop. est. 1897, 18,000.

**Columbus**, Lowndes co., Miss., on Tombigbee River. Railroads: M. & O.; and the Southern Ry. Industries: cotton mills, flouring mills, iron foundry, manufacture of agricultural implements, and many small factories. Large quantities of coal in vicinity. Surrounding country agricultural and mineral. Pop. est. 1897, 10,000.

**Columbus,** Bartholomew co., Ind., on e. fork of White River, 41 mi. s. by e. of Indianapolis. Railroads: Jefferson, Madison & Indianapolis; C. C. C. & St. L.; P. C. & St. L. Principal industries: tanneries, lumber mills, woolen and starch works, furniture factories, and agricultural implements. Pop. est. 1897, 6,800.

**Columbus**, Franklin co., O., on Scioto River, 120 mi. n.e. of Cincinnati. Railroads: B. & O.; P. C. & St. L.; C. St. L. & P.; and eight others. It has a large inland trade in grain, wool, live stock, iron and coal, and important manufactures, principally iron and steel products, agricultural implements, and carriages. Lumber, leather, edge tools, and plows are also largely produced. It has a magnificent state capitol, State University of Ohio, Capital University, Ohio Agricultural and Mechanical College, and institutions for the blind, deaf, and dumb, and a large state penitentiary. Pop. est. 1897, 100,000.

Columbus, CHRISTOPHER (1436-1506), the discoverer of America, was b. in Genoese terin life developed a taste for geographical knowledge. In 1470 he married the daughter of Palestrello, a navigator. About this time he formed the opinion that undiscovered land lay west of Spain, and that it belonged to the continent of Asia. Aug. 3, 1492, by the aid of Isabella, queen of Spain, he was enabled to start on a voyage in search of a shorter route to India than the one around Africa. October 12 he landed on the island of Guanahani and named it San Salvador. He reached Cuba October 28, and Hayti December 6. Jan. 4, 1493 he returned to Spain. He made a second and third voyage, discovering a number of islands, and the main land of South America. Hoping to find the passage to India through Darien, he undertook a fourth voyage, May 9, 1502. In this expedition he was accompanied by his brother Bartolommeo and his son Her-He encountered every imaginable nando. disaster from storms and shipwreck, and returned to Spain, sick and exhausted, in 1504. After two years of illness, humiliations, and despondency, he d. at Valladolid. His remains were transported, according to his will, to the city of St. Domingo, but on the cession of Hispaniola to the French they were removed in January, 1796, to the cathedral of Havana in Cuba.

**Col'umn**, in architecture, a round pillar, a cylindrical solid body set upright and primarily intended to support some superincumbent weight. A column has as its most essential portion a long solid body, called a *shaft*, set vertically on a *stylobate*, or on a congèries of moldings which forms its *base*, the shaft being surmounted by a more or less bulky mass which forms its *capital*. In classical architecture columns have commonly to support an *entablature* consisting of three divisions, the *archi*-

#### Comanches

trave, frieze, and cornice, adorned with moldings, etc. Columns are distinguished by the names of the styles of architecture to which they belong; thus there are Hindu, Egyptian, Grecian, Roman, and Gothic columns. In classic architecture they are further distinguished by the name of the order to which they belong, as Doric, Ionic, Corinthian, Composite, or Tuscan columns. They may also be characterized by some peculiarity of position, of construction, of form, or of ornament, as attached, twisted, cabled, etc., columns. Columns are chiefly used in the construction or adornment of buildings. They have also been used, however, singly for various purposes, especially for monuments.

**Comanches** (kö-man'chēz), an American Indian tribe formerly roaming through Texas and part of Mexico. They were excellent horsemen, and extremely warlike, but their numbers are now insignificant. Some of them have been collected on a reservation in the western part of the Indian Territory.

**Comayagua** (kō-mā-vä'gūà), a town of Central America, in Houduras, the capital of department of the same name, situated on the southern border of the plateau of Comayagua, about midway between the two oceans; a poor place. Pop. 6.240.

**Comb**, an instrument with teeth, made of tortoise shell, ivory, horn, wood, bone, metal, or other material, used for dressing the hair, and by women for keeping the hair in its place when dressed. Combs have been used from the earliest times by rude as well as by eivilized races.

**Combaco' num**, a town of Hindustan, presidency of Madras, district of Tanjore. It was the ancient capital of the Chola dynasty, and is one of the most ancient and sacred towns in the presidency. It has a great many well endowed Hindu temples, a government college, courts, etc. Pop. 50,098.

Combustion, the operation of fire on inflammable substances, or the union of an inflammable substance with oxygen or some other supporter of combustion, attended with heat and in most instances with light. In consequence of the combination of the carbon in fuel with the oxygen of the air being the universal method of getting heat and light, and as when the action takes place the fuel is said to burn or undergo combustion, the latter term has been extended to those cases in which other bodies than carbon-for example, phosphorus, sulphur, metals, etc.-burn in the air or in other substances than air-for example, chlorine. Though the action between the gas and the more solid material, as coal, wood, charcoal, of whose combination combustion is the result, is mutual, the one having as much to do with the process as the other, yet the former, as oxygen, chlorine, iodine, and the compounds which they form with each other and with nitrogen, have received the name of supporters of combustion, while to the latter the term combustibles has been assigned.

Spontaneous Combustion is the ignition of a body by the internal development of heat

without the application of fire. It not unfrequently takes place among heaps of rags. wool, and cotton when lubricated with oil; hay and straw when damp or moistened with water; and coal in the bunkers of vessels. In the first case the oil rapidly combines with the oxygen of the air, this being accompanied with great heat; in the second case the heat is produced by a kind of fermentation; in the third by the pyrites of the coal rapidly absorbing and combining with the oxygen of the air. The term is also applied to the extraordinary alleged phenomenon of the human body being reduced to ashes without the direct application of fire. It is said to have occurred in the aged and persons that were fat and hard drinkers; but most chemists reject the theory altogether, maintaining that none of the instances adduced are well authenticated.

**Com'ets**, certain celestial bodies which appear at irregular intervals, moving through the heavens in paths which seem to correspond with parabolic curves, or in a few instances in elliptical orbits of great eccentricity. The former, after being visible from the earth for a shorter or longer time, disappear into space apparently never to return; the latter return to us periodically. Some comets are only visible by the aid of the telescope, while others can be seen by the naked eye. In the latter case they usually appear like stars accompanied with a train of light, sometimes short and sometimes extending over half the sky, mostly single and more or less curved, but sometimes forked. In a comet which appeared in 1744 the train was divided into several branches. The spreading out from the head like a fan. train is not stationary relatively to the head, but is subject to remarkable movements. The direction in which it points is always opposite to the sun, and as the comet passes its perihelion the train changes its apparent position with extraordinary velocity. The head of the comet is itself of different degrees of luminosity, there being usually a central core, called the nucleus, of greater brilliancy than the surrounding envelope, called the coma.

Comets were long regarded as supernatural objects, and usually as portents of impending calamity. Tycho Brahe was the first who expressed a rational opinion on the subject, coming to the conclusion that the comet of 1577 was a heavenly body at a greater distance from the earth than that of the moon. The general law of the motion of the bodies, as well as his own observations on the comet of 1680, led Newton to conclude that the orbits of the comets must, like those of the planets, be ellipses, having the sun in one focus, but far more eccentric: and having their aphelions, or greater distances from the sun, far remote in the regions of space. This idea was taken up by Halley, who collated the observations which had been made of all the twenty-four comets of which notice had been taken previous to 1680. The results were very interesting. With but few exceptions the comets had passed within less than the earth's shortest distance from the sun, some of them within less than

one third of it, and the average about one half. Out of the number, too, nearly two thirds had had their motions retrograde, or moved in the opposite direction to the planets. While Halley was engaged on these comparisons and deductions the comet of 1682 made its appearance, and he found that there was a wonderful resemblance between it and three other comets that he found recorded-the comets of 1456, of 1531, and of 1607. The times of the appearance of the comets had been at very nearly regular intervals, the average period being between seventy-five and seventy-six years. Their distances from the sun, when nearest to that luminary, had been nearly the same, being nearly six tenths of that of the earth, and not varying more than one sixtieth from each other. The inclination of their orbits to that of the earth had also been nearly the same, and their motions had all been retrograde. Putting these facts together Halley concluded the comets of 1456, 1531, 1607, and 1682 were reappearances of one and the same comet, which revolved in an elliptic

orbit round the sun, performing its circuit in a period varying from a little more than seventysix years to a little less than seventy-five; or having, as far as the observations had been carried, a variation of about fifteen months in the absolute duration of its year, measured according to that of the earth. For this variation in the time of its revolution Halley accounted upon the supposition that the form of its orbit had been altered by the attraction of the

remote planets Jupiter and Saturn as it passed near to them; and thence he concluded that the period of its next appearance would be lengthened, but that it would certainly re-appear in 1758 or early in 1759. As the time of its expected reappearance approached, Clairaut calculated that it would be retarded 100 days by the attraction of Saturn, and 518 by that of Jupiter, so that it would not come to the perihelion, or point of its orbit nearest the sun till April 13, 1759. It actually reached its perihelion on March 13, 1759, being thirty days earlier than had been calculated. Along the period of this comet and its perihelion distance the magnitude and form of its path were also calculated. Estimating the mean distance of the earth from the sun at 95,000,000 mi. (the number which was at that time considered the true one), the mean distance of the comet was calculated to be 1,705,250,000 mi.: its greatest distance from the sun, 3,355,400,000: its least distance 55,100,000; and the transverse or largest diameter of its orbit, 3,410.-500,000. This comet, therefore, is a body belonging to the solar system, and quite beyond the attraction of any body which does not be-long to that system. In 1835 it again returned, being first seen at Rome, August 5, and from that time continued to be observed till the end of the year in Europe, and through a great part of spring 1836 in the southern hemisphere.

The comet denominated Encke's comet, which has made repeated appearances, and first observed in 1818, and was identified with a comet observed in 1786, also with a comet discovered in 1795 by Miss Herschel in the constellation Cygnus, and with another seen in 1805. Its orbit is an ellipse of comparatively small dimensions, wholly within the orbit of Jupiter; its period is 1.260 days, or about  $3_{10}^{2}$  years. It has been frequently ob-served since. Another comet, the history of which is of the utmost importance in the latest theories regarding the connection of these bodies and the periodic showers of shooting stars, is one known as Biela's comet, discovered in 1826. It revolves about the sun in about 64 years, and was identified as the same comet which was observed in 1772 and in 1806. Its returns were noted in 1832, 1839, and 1845. In 1846 it divided into two, returned double in 1852, but has not since been seen, the supposition being that it has been dissipated, and that it was represented by a great shower of meteors that were seen in November, 1872.



Donati's Comet, 1858.

One of the most remarkable comets of recent times was that known as Donati's, discovered by Dr. Donati of Florence in 1858. The paths in which comets move are not, like those of planets, all nearly in the same plane as the orbit of the earth, but are inclined to that orbit at all angles. The orbits of the comets are at all possible angles; and the number increases with the angle, so that they approximate to an equal distribution in all directions round the sun as a center. A modern theory of the nature of comets is that these bodies were ejected millions of years ago from the interior of suns, or planets in a sunlike state. When a comet is viewed through a telescope of considerable power, there appears a dense nucleus in the center of the luminous and apparently vaporous matter of which the external parts are composed; and the opacity of this nucleus varies in different comets. On its first appearance, and again when it recedes, the luminous part of the comet is faint and does not extend far from the nucleus; but as it moves on toward the perihelion the brightness increases, and the luminous matter lengthens into a train, which, in some cases, has extended across a fourth of the entire circumference of the heavens. The most remarkable discovery of recent times regarding comets is the identity of the course of some of them with the orbit of certain showers of shooting stars. This was

first demonstrated by the Italian astronomer Schiaparelli, who proved the agreement between the orbit of the great comet of 1862 and that of the star shower seen annually about August 9, 10. It has since been demonstrated that every meteoric stream follows in the trail of some comet large or small, which wither exists now or has been dissipated, as Biela's comet was, leaving only its meteoric train to show where it once traveled; and that every comet is followed or preceded by a train of meteors, extending over a greater or less portion of the comet's orbit according to the length of time during which the comet has existed.

**Comma**, in punctuation, the point [, ] denoting the shortest pause in reading, and separating a sentence into divisions or members according to the construction. In music, a comma is the smallest enharmonic interval, being the difference between a major and a minor tone, and expressed by the ratio 80:81.

**Commentry** (kom-män-trē), a town of France, dep. of Allier, 8 mi. s.e. of Montluçon, in the midst of a vast coal field, to which the town owes its prosperity. Pop. 12,416.

**Commerce,** CHAMBER OF, a board chosen from among the merchants and traders of a city to protect the interests of commerce; to lay before the legislature the views of their members on matters affecting commerce; to furnish statistics as to the staple trade of the locality; and to attain by combination advantages which could not be reached by private enterprise, etc. These associations originated in France early in the eighteenth offutury. A system of international chambers of commerce for promoting relations with foreign countries has been largely adopted. Nearly all large cities in the U.S. have chambers of commerce. Some are incorporated.

**Commercial Law**, the law which regulates commercial affairs among the merchants of different countries, or among merchants generally. It is derived from the different maritime codes of mediaeval Europe, the imperial code of Rome, international law, and the custom of merchants. In this country the term is applied to that system of laws which refers to mercantile contracts, and is based upon the custom of merchants. The principal subjects embraced within it are the laws of shipping, including that of marine insurance; the law of negotiable bills of exchange and promissory notes; and the law of sales.

**Commercial Treaties**, treaties entered into between two countries for the purpose of improving and extending their commercial relations; each country engaging to abolish or to reduce to an agreed rate or otherwise modify the duties on articles of production and manufacture imported from the one country into the other. They are usually for a limited period but may be renewed and modified according to altering conditions. In the treaties the phrase, "most favored nation," implies concessions equal to the most favorable granted under any similar treaty.

Commines (ko-mēn), PHILIPPE DE (1445-

1509), French writer and statesman. His *Memoires*, published in 1523, were valuable as contributions to the history of his times.

**Committee of Public Safety**, a body elected by the French Convention (April 6, 1793) from among its own members, at first having very limited powers conferred upon it—that of supervising the executive and of accelerating its actions. Subsequently, however, its powers became extended; all the executive authority passed into its hands, and the ministers became merely its scribes.

**Common Council**, the council of a city or a corporate town, empowered to make by-laws for the government of its citizens. The common councils sometimes consist of two houses, chambers or courts, and sometimes form only one. In our American cities the city council is generally composed of two branches, called respectively, select and common. They are elected by the people.

Common Law, the unwritten law, the law that receives its binding force from immemorial usage and universal reception, in distinction from the written or statute law; sometimes from the civil or canon law: and occasionally from the lex mercatoria, or commercial and maritime jurisprudence. It consists of that body of rules, principles, and customs which have been received from former times, and by which courts have been guided in their judicial decisions. The evidence of this law is to be found in the reports of those decisions and the records of the courts. Some of these rules may have originated in edicts or statutes which are now lost, or in the terms and conditions of particular grants or charters; but it is quite certain that many of them originated in judicial decisions founded on natural justice and equity, or on local customs. It is contrasted with, 1, the statute law contained in acts of Congress; 2, equity, which is also an accretion of judicial decisions, but formed by a new tribunal, which first appeared when the common law had reached its full growth; and 3, the civil law inherited by modern Europe from the Roman Empire. Wherever statute from the Roman Empire. law, however, runs counter to common law, the latter is entirely overruled; but common law, on the other hand, asserts its pre-eminence where equity is opposed to it.

**Common Pleas,** in law, pleas brought by private persons against private persons, or by the government, when the cause of action is of a civil nature. In many states of the U. S. a court having jurisdiction generally in civil actions. In England the Court of Common Pleas is now merged in the High Court of Justice.

Commons, House or. See Parliament.

**Common Sense,** the philosophy of the socalled Scotch school of philosophy founded by Thos. Reid (1710-96), who aimed to establish a series of fundamental truths indisputable as primitive facts of consciousness. He taught that the general consent of mankind as to the existence of an external world, as to the difference between substance and qualities, between thought and the mind that thinks, is sufficient

to establish the reality of a permanent world apart from ourselves; and he maintains that sensations are not the objects of our perception, but signs which introduce us to the knowledge of real objects.

**Commune**, a small territorial district in France, being one of the subordinate divisions into which that country is parceled out; the name is also given to similar divisions in some other countries, as Belgium. In the country a commune sometimes embraces a number of villages, while some large cities are divided into a number of communes. In either case each commune is governed by an officer called a mayor.

Commune of Paris.-1, A revolutionary committee which took the place of the municipality of Paris in the French Revolution of 1789, and soon usurped the supreme authority in the state. Among its chiefs were some of the most violent of the demagogues, such as Hébert, Danton, and Robespierre. 2, The name adopted by the ultra-radical party in Paris brought once more into prominence by the events of the Franco-German War, more immediately by the siege of Paris (October, 1870, to January, 1871). They ruled over Paris for a brief period after the evacuation of the German troops, and had to be suppressed by troops collected by the National Assembly of The rising was entirely political and France. confined to Paris; it was based on no well-defined dogmas, only a fractional part of the communal government being communists in the economic sense, and these were soon thrust aside by their more violent and unscrupulous comrades.

**Com'munism**, the economic system, or theory, which upholds the absorption of all proprietary rights in a common interest, an equitable division of labor, and the formation of a common fund for the supply of all the wants of the community: the doctrine of a community of property, or the negation of individual rights in property. No communistic society has as yet been successful. Robert Owen made several experiments in modified communism, but they failed. St. Simon, Fourier, and Proudhon, have been the chief exponents of the system in France; and under the names of socialism, nihilism, etc., it seems to be working as a great, unseen force in several countries.

**Como**, capital of the province of Como, in the north of Italy (Lombardy), 24 mi. n.n.w. of Milan, in a delightful valley at the s.w. extremity of Lake Como. It has a splendid marble cathedral dating from the fourteenth century, the old church of S. Fedele of the tenth century, the townhall finished in 1215, the fine theater built in 1813. Here were born Pliny the elder and younger, and Volta, the natural philosopher. Pop. 25,560. The province of Como has an area of 1,049 sq. mi., and a pop. of 515,134.

a pop. of 515,134. **Como**, a lake in the north of Italy, at the foot of the Alps, fed and drained by the river Adda. It is celebrated for the beautiful scenery of its shores, which are covered with handsome villas, gardens, and vineyards, mountains raising behind to the height of 7,000 ft. Trout and other fish abound in the lake.

**Comorin'**, a cape forming the south extremity of Hindustan, and consisting of a low, sandy point.

sandy point. **Com'oro Islands,** a volcanic group in the Indian Ocean, between the northern extremity of Madagascar and the continent of Africa. They are four in number; Great Comoro, Mohilla, Johanna, and Mayotta. Area 758 sq. mi.; pop. 62,500.

**Compass**, an instrument used to indicate the magnetic meridian or the position of objects with respect to that meridian, and employed especially on ships, and by surveyors and travelers. Its origin is unknown, but it is supposed to have been brought from China to Europe about the middle of the thirteenth century. As now generally used it consists of three parts; namely, the box, the card or fly, and the needle-the latter being the really essential part, and consisting of a small magnet so suspended that it may be able to move freely in a horizontal direction. The box, which contains the card and needle, is, in the case of the common mariner's compass, a circular brass receptacle hung within a wooden one by two concentric rings called gimbals, so fixed by the cross centers to the box that the inner one, or compass-box, shall retain a horizontal position in all motions of the ship. The circular card is divided into thirty-two equal parts by lines drawn from the center to the circumference, called points or rhumbs; the intervals between the points are also divided into halves and quarters, and the whole circumference into equal parts or degrees, 360 of which complete the circle. The four principal are called cardinal points, viz., North, South, East, and West. The names of the rest are compounded of these. The needle is a small bar of magnetized steel. It is fixed on the under side of the card, and in the center is placed a conical socket, which is poised on an upright pointed pin fixed in the bottom of the box; so that the card, hanging on the pin, turns freely round its center, and one of the points, by the property of the needle, will always be directed toward the north pole. The needle, however, is liable to a certain deviation, owing to the magnetism of the ship itself, and this is especially strong in iron ships. To obviate this defect Sir W. Thomson has invented a compass having a number of needles arranged in a particular manner instead of one. In this compass quadrantal errors are corrected by means of two iron globes fixed on opposite sides of the binnacle; while the various components of the ship's magnetic force are neutralized by a series of bar magnets so arranged as to act as correctors. In the compass used by land surveyors and others the needle is not fixed to the card, but plays alone, the card being drawn on the bottom of the box

**Compasses** (or pair of compasses), a mathematical instrument used for the describing of

circles, measuring lines, etc. They consist simply of two pointed legs, movable on a joint or pivot, and are used for measuring and transferring distances. For describing circles the lower end of one of the legs is removed and its place supplied by a holder for a pencil or pen. Hair compasses are compasses having a spring tending to keep the legs apart, and a finely threaded screw by which the spring can be compressed or relaxed with the utmost nicety, and the distance of the legs regulated to a hair's breadth. Bow compasses are compasses having the two legs united by a bow passing through one of them, the distance between the legs being adjusted by means of a screw and nut. Proportional compasses are compasses used for reducing or enlarging drawings, having the legs crossing so as to present a pair on each side of a common pivot. By means of a slit in the legs, and the movable pivot, the relative distances between the points at the respective ends may be adjusted at pleasure in the required proportion.

**Compos**<sup>7</sup>**itze**, the largest known nat. order of plants, containing over 12,000 described species of herbs or shrubs distributed all over the world. The flowers are numerous and sessile, forming a close head on the dilated top of the receptacle, and surrounded by an involucre of whorled bracts. The flowers are monopetalous, and the order is divided into three natural groups from the form of the corolla: 1, *Tubulifora*, in which it is tubular, with five, rarely four, teeth; 2, *Labiatiflora*, in which it is divided into two lips; and 3. *Liguliflora*, in which it is slit or ligulate. The stamens are united into a tube. The style is two-cleft at the apex. The fruit is dry and seed-like. The head of numerous florets was called by the older botanists a compound flower, hence the name.

**Composite Order**, in architecture the last of the five orders: so called because the capital belonging to it is composed out of those of the other orders, borrowing a quarter-round from the Tuscan and Doric, a row of leaves from the Corinthian, and volutes from the Ionic. Its cornice has simple modillions or dentils. It is called also the *Roman* or the *Italic* order.

It is called also the Roman or the Itdic order. Composition of Forces and Motions, in mechanics, the union or assemblage of several forces or motions that are oblique to one another, into an equivalent force or motion in another direction. Thus two forces acting in the directions of the adjacent sides of a parallelogram, compose one force acting in the direction of the diagonal, and if the lengths of the adjacent sides represent also the magnitudes of the forces, the diagonal will represent the magnitude of the compound force.

**Compressed Air**, atmospheric air compressed by means of pumps, etc. As a means of transmitting power, compressed or condensed air received the attention of scientists as early as 1700 A.D. In that year, Dr. Papin, of Blois, the first man to apply a piston in a steam cylinder, the inventor of the digester and the steelyard safety valve, employed com-

pressed air to drive a piston in a cylinder which was intended to drive a pump. He used a fall of water to compress the air in a cylinder. His experiments were not success-About 100 years later, a Welsh engineer ful. used the power derived from a heavy fall of water to work a blowing cylinder from which the air was conveyed to a blast furnace, a mile and a half distant, The blast, however, was too feeble to do much work. About 1840, an English patent for the application of compressed air to working cranes, hoisting machines, and other machinery was granted. The air was compressed by an air pump, or compressor, and was conducted through pipes to the machinery. Compressed air frequently is called a "power." This is a misnomer, for the prime mover is the steam engine, turbine, or other form of water wheel, which operates the pump or compressor which compresses the The elastic air under pressure transmits air. the power used in compressing it when it is permitted to expand in a suitable device which will respond to the pressure exerted. In practise, the air is compressed by a pump or compressor, which, in its simplest form. is a piston working in a cylinder. The air is sucked in through suitable valves, with one stroke of the cylinder, compressed with the next stroke, and thus forced into a reservoir from which the service pipes lead.

Another method of using compressed air has been developed by the improvements made in automobile or horseless carriages. and motors for hauling street cars. The air. under enormous pressure, is stored in steel bottle-shaped reservoirs made seamless from a solid ingot of steel. These bottles are made to sustain a pressure of 2,000 lbs. or more to the sq. in. When charged with the compressed air, they are coupled, singly or in series, with the auxiliary reservoir on the motors, and a suitable reducing valve permits the air to fill the auxiliary reservoir until the working pressure of from 10 to 100 lbs. is secured. In practise, a small fire of coal, coke, gasoline, or kerosene, is maintained to heat the air just before it is expanded into the working cylinder. The heat not only gives the compressed air added efficiency, due to the expansion caused by heat, but it also removes the objection due to the snow and ice formed by the suddenly released air. In compressing the air, heat is formed; in suddenly expanding the air, the heat is absorbed so rapidly that ice and snow are formed. This has been an objectionable feature in the use of compressed air for transmitting power.

Compressed air is used for operating the automatic brakes which now are part of the equipment of every passenger car, locomotive, mail car, baggage car, and sleeping car in the U. S., and over half a million freight cars. In a few years, every freight car, and in fact every car of whatever description that is used on a railroad in the U. S. must under the federal law, be equipped with automatic air brakes. Compressed air also is used to operate rock drills, air motors in manufacturing establishments, air hoists of every description, passenger and freight elevators, clocks, to lift water, acids, and other liquids, as an agitator in preparing asphaltum for street paving, to paint broad surfaces, bridges, freight cars, warehouses, and buildings, to force plastic material through dies, holes, and pipes, to operate motors for hauling street cars, mine cars, and cars on railroads, to operate motocycles, automobiles, and all forms of horseness vehicles, to inflate "pneumatic" tires for bicycles and carriages, to drive the sand in a sand blast: to clean carpets, rugs, cars, etc., and for hundreds of other purposes.

George Westinghouse, Jr. invented the automatic air brake, which is standard on American railroads. He first made what was known as the "straight air" system, in which the brakes were set by direct pressure from the main reservoir. But this system was not automatic, and the engineer never was sure that all the brakes were set. Any leaks in the service pipes or elsewhere lowered the efficiency of the brake. The vacuum system was directly opposite to the direct air system. In it an imperfect vacuum was maintained, and atmospheric pressure did the work. The development of the air brake led to the invention and adoption of the "automatic air brake" system. The principal features of this system are the air pump, installed on the locomotive just in front of the cab; the main reservoir in which the compressed air is stored; the engineer's valve in the engine cab by which all the operations of the air brake are controlled; the train pipe, or principal service pipe which supplies the auxiliary air reservoirs under each car with compressed air; the triple valve which serves to feed the compressed air into the auxiliary reservoirs, and to supply the brake cylinder with air. It is this triple valve which makes the system automatic.

The air pump stands in front of the locomotive cab. It is strong, compact, and has two cylinders; a steam cylinder which drives the piston of the air cylinder. A valve, regulated by the pressure of the air in the main reservoir, throttles the steam to the air pump when the requisite pressure of air is secured. The air, compressed by the air pump, is led through a pipe to the main storage tank which generally is placed between the steam cylinder just back of the pilot. From this air tank, a pipe leads to the engineer's valve in the engine cab, within easy reach of the engine driver. This valve is a three-way valve. The air, generally, is compressed to a pressure of 90 lbs. to the sq. in., in the main reservoir. A certain movement of the handle of the engineer's valve opens the ports which permit the air to pass into the train pipe which runs from the locomotive under each car. This pipe is connected between the cars by a rubber hose, so that it is continuous. The engineer permits about 70 lbs. pressure of air to fill the car The air reservoirs through the train pipe. passes through the triple valve, which is so constructed that when the pressure of air in the car reservoir is the same as that in the train

pipe, the valve is balanced, and will respond to a decrease or increase of pressure from one side or the other. In this balanced, or normal condition, there is no connection between the car reservoir and the air brake cylinder. But when the engineer wishes to apply the brakes, he throws the handle of the engineer's valve to a certain position. That opens a port which permits the air in the train pipe to escape into the open air. This lowers the pressure in the train pipe, and the balanced valve, responding to the higher pressure in the car reservoir, slides back, and thus opens an aperture which permits the air in the car reservoir to reach the brake cylinder. The pressure of the air forces the piston of the brake cylinder forward, and this piston, through suitable levers, presses the brake shoes against the wheels and the brakes are set. Within the brake cylinder is When the engineer desires to a coiled spring. release the brakes, he feeds air from the main reservoir on the locomotive into the train pipe, thus increasing the pressure. This forces the balanced valve the other way, and thus opens an aperture which releases the air in the brake cylinder into the open air. The coiled spring reacting, forces the brake piston back to its normal condition, and thus releases the brakes.

A compressed air motor for hauling street cars is simply a reservoir in which compressed air is stored, and a driving mechanism, which in all its essential parts, is almost identical with a steam locomotive; that is, it has cylinders with pistons which are connected with the driving wheels. The air is compressed at a central station, and stored in a large tank. A pipe connection is made with the storage tank of the motor, and the tank is charged with air from the central reservoir. In practise, the air from the storage tank on the motor passes through a pipe to the working cylinders, and this pipe passes through water which is heated by a fire to  $300^{\circ}$  or more, and maintained at that temperature. This, it is estimated, gives an added efficiency of at least 5 per cent. to the compressed air and also prevents the valves and working gear from clogging because of the ice and snow which would form from cold air. Sometimes the reservoir on the motor is simply a cylindrical tank. But the later improvements make the reservoir a group or bundle of steel bottles, which are capable of withstanding pressures of 2,000 lbs. or more to the sq. in. A reducing valve lowers this storage pressure to a working pressure of from 50 to 150 lbs. Compressed air motors can be reversed, as steam locomotives are, and suitable valves permit the motorman to apply storage pressure direct to the working cylinders if necessary. At this time (1897) compressed air as a motive power is an experiment, although in several cities of the U.S. and Europe there are compressed air motors in daily operation. It is claimed that by heating the air before it enters the working cylinders, an efficiency of 92 per cent. is secured against 70 per cent. when not heated. Within a few years, the use of compressed air in lifting water has worked a revolution in water-works practises. It has come rapidly into use because of its simplicity as a means of raising water from deep wells, and because it increases the yield of wells that have begun to decrease in capacity. The conspicuous feature of the "air lift," as it is called, is that it takes all the water a well can supply, whereas a mechanical pump, it is estimated, sometimes gives less than 20 per cent. of the capacity of the well. A pipe for the compressed air is let down into a well, and forces the water up through another pipe which either encloses the compressed air pipe or is another pipe altogether. A system or group of wells can be operated from a central plant, where the air is compressed and led to the wells.

Rock drills are working cylinders mounted on tripods, the pistons of the cylinders have drills fastened to the end, and the air drives the pistons up and down, causing the drills to do work. A number of drills are supplied with air through pipes which lead back to the main air reservoir. The first work of any moment done by compressed air was in 1861, driving the Mont Cenis tunnel. The first successful application of compressed air to rock drills in America was made by Walter Shanly, in driving the Hoosac tunnel, 1868-1874. It was in that tunnel that nitroglycerine was first introduced in the U.S. The largest compressed-air plant in America is at Quinnsec Falls, in Michigan, on the Menominee River. The initial power is derived from the falls, which are 47 ft. in height. The plant consists of three pairs of Rand compressors, 32 in. diameter by 60 in. stroke, and one pair 36 in. diameter and 60 in. stroke, delivering 3,000 horse power through 31 mi. of pipe to the Chapin and Ludington iron mines at Iron Mountain for pumping, hoisting, and motive power engines above ground, and direct acting pumps and rock drills below ground. The power is carried through a 24 in. pipe with a loss of only one pound in pressure, with a working efficiency of 75 per cent. Data se-cured from contractors on the main drainage channel of the sanitary district of Chicago in excavating the drainage canal, shows that the cost of drilling with steam was 8.64 cents per cubic yard of rock; with compressed air, 6.30 cents per cubic yard of rock. Compressed air is coming into use in boiler shops, machine shops, foundries, railroad shops, etc. In the Topeka shops of the Atchison, Topeka & Santa Fé Railroad Co., five miles of air pipe are used in the shops and around the grounds. Some idea of the saving in labor secured by the use of compressed air in railroad shops can be found in the following illustrations: the stay bolt cutter will do the work of fifteen men; rotary grinder saves the work of six men; rotary saw, for sawing car roofs, saves the work of four men; pneumatic hammer saves the work of three men; pneumatic painting machine, one man does the work of ten painting by hand; device for cleaning coaches saves the work of ten men.

Following are some of the uses to which

#### Concentration

compressed air is put in railroad shops: elevating sand at engine house, elevating oil at oil house, hoisting heavy castings and tools, forcing couplings on air hose, operating cylinder boring bar, operating valve facing machine, filling cylinders of hydraulic presses, removing and applying driving tires, testing water pumps after repairs, drilling, tapping, and reaming with motors, cleaning boilers and machinery, punching jacket rivet holes, taking old paint off tin roofs, chipping, catting, and caulking, operating letter presses, jacking up cars and trucks, cleaning interior of cars and upholstered work, burning paint off coaches, painting cars, etc.

Compressed air is used on the vessels of the U. S. navy for the following purposes: to operate main engine auxiliaries, auxiliary, fire, bilge, and water service pumps, steering engine, boat cranes, turret-turning engines, hydraulic cylinders for working guns, ammunition hoists, ash hydro-pneumatic hoists, feed pumps, smoke hose for guns, whistle and siren, to send messages about the ship through pneumatic tubes, to clear a compartment of water when filled, to ventilate, heat, and cool the ship, and to operate the engine of the ordinary working launch. Compressed air also is used in dynamite guns.

**Com' stock Lode**, a large and extremely rich metallic lode in the western part of Nevada, on the eastern slope of the Virginia Mountains. To it belong the Big Bonanza and other mines, which have yielded gold and silver to the value of over \$300,000,000.

Comte (Kont), AUGUSTE (1708-1857), founder of the "positive" system of philosophy. He was educated at the Ecole Polytechnique, and embraced enthusiastically the socialist tenets of St. Simon. He was employed, in 1820, to draw up a formula of the doctrines professed by the St. Simonian school. This work did not, however, meet with the approbation of St. Simon. In 1826 Comte commenced a course of lectures on positive philosophy, but only four lectures were given when he became deranged in mind, and did not recover till the end of 1827. In 1830 he commenced the publication of his Cours de Philosophie Positire, which was completed in 1842, and was translated into English and condensed by Harriet Martineau. As a practical faith his system is now stationary. though as a philosophy of knowledge it is widely accepted.

**Co mus,** in the later Greek mythology, the god of revelry, feasting, and nocturnal entertainments, generally represented as a drunken youth.

**Concan**, a maritime subdivision of Hindustan, in the presidency of Bombay. It includes the town and island of Bombay. Area about 13,639 sq. mi.; pop. about 537,933.

**Concentration**, in chemistry, the act of increasing the strength of solutions. This is effected in different ways: by evaporating off the solvent, as is done in the separation of salt from sea water; by distilling off the more volatile liquid, as in the rectification of spirit of wine; by the use of low temperatures, as in the

purification of benzol; by difference of fusibility, as in Pattison's process for desilvering lead.

**Concepcion'**, a seaport of Chile, capital of a province of the same name, on the right bank of the Biobo, 71 mi. from its mouth, a well-built town, with a cathedral. Its port at Tal-cahuano, a small town on the Bay of Concepcion, about 8 mi. distant, is one of the best in Chile. Concepcion was founded in 1550, and has suffered much from earthquakes and attacks by the Araucanians. Pop. 25,120.

**Concertl'na**, a musical instrument invented by Professor Wheatstone, the principle of which is similar to that of the accordion. It is composed of a bellows, with two faces or ends, generally polygonal in shape, on which are placed the various stops or studs, by the action of which air is admitted to the free metallic reeds which produce the sounds.

**Conch** (kongk), a marine shell, especially a large spiral shell of a trumpet shape, and which may be blown as a trumpet, as is the practise in Hindustan and some of the Pacific Islands.

**Conchifera** (kon-kif'é-rā), Lamarck's name for that large class of acephalous mollusks which have shells consisting of two pieces, commonly known as oyster, mussel, etc.

**Conchol ogy**, the science of shells, that department of zoology which treats of the nature, formation, and classification of the shells with which the bodies of many mollusca are protected; or the word may be used also to include a knowledge of the animals themselves, in which case it is equivalent to *malacology*. In systems of conchology shells are usually divided into three orders, Univalves, Bivalves, and Multivalves, according to the number of pieces of which they are composed.

**Con' cord,** in music, the combination of two or more sounds pleasing to the ear. Concords are the octave, the fifth, third, and sixth. The first two are called *perfect*, because as concords they are not liable to any alteration by sharps or flats. The two last are called *imperfect*, as being alterable.

**Concord**, a town of Massachusetts, near the Concord River, 18 mi. n.w. of Boston. Here at Concord Bridge, April 19, 1775, the first shots of the American Revolution were fired and a monument on the bank of the river marks where two English soldiers fell. It is famous as the home of Ralph Waldo Emerson, Hawthorne, Thoreau, and Alcott. Pop. 5,100.

**Concord,** the capital of the state of New Hampshire, on the Merrimac River 59 min.w. of Boston. It was once called Rumford and here Benjamin Thompson, afterward Count Rumford, resided. It is one of the largest railway centers in New England. It has manufactures of carriages, hardware, cutlery, woolen fabrics, paper, etc. Pop. 17,004.

**Con'crete**, a composition used in building, consisting of hydraulic or other mortar mixed with gravel or stone chippings about the size of a nut. It is used extensively in building under water, for example, to form the bottom of a canal or sluice, or the foundation of any structures raised in the sea; and it is also frequently used to make a bed for asphalt pavements, or to form foundations for buildings of any kind. It is sometimes even used as the material with which the walls of houses are built, the concrete being firmly rammed into molds of the requisite shape, and then allowed to set.

**Concre'tions,** MORBID, in animal economy, hard substances that occasionally make their appearance in different parts of the body, as well in the solids as in those cavities destined to contain fluids. They are usually named according to the parts of the body in which they occur. Their composition is equally various, but the most common constituents are phosphates, urates, or other salts, in combination with mucus, albumen, fibrin, and other organic matter.

**Conde** (kõn-dē), town and fortress of France, dep. Nord, at the confluence of the Hayne and Scheldt. It gave their title to the Condé family. Pop. 3,382.

Condé, Louis de Bourbon, PRINCE of (the Great Condé) (1621-1687), a famous general. In 1641 he married a niece of Cardinal Richelieu. His defeat of the Spanish at Rocroi, in 1643, was followed, in 1645, by his defeat of Mercy at Nordlingen, and by his capture of Dunkirk in 1646, the year in which he inherited his father's title. During the troubles of the Froude he at first took the side of the court; but believing himself to be ill requited by Mazarin, he put himself at the head of the faction of the Petits Maîtres, and was im-prisoned for a year by Mazarin (1650). On his release he at once put himself at the head of a new Fronde, entered upon negotiations with Spain, and, his attack of Paris being indecisive, retired to the Netherlands, where he was appointed generalissimo of the Spanish armies. In this capacity he unsuccessfully besieged Arras in 1654; but he was more fortunate at Valenciennes in 1656, and at Cambrai in 1657. In 1658 he was defeated before Dunkirk by Turenne, but was restored to his rank in France after the peace of 1659. In 1668 he accomplished the reduction of Franche Comté in three weeks; and in 1674 he defeated the Prince of Orange at Senef. His successes over Montecuculi in Alsace in 1675 closed his military career. Four years after he retired to Chantilly, near Paris, and d. at Fontainebleau. Condé, Louis Joseph DE Bourbon, Prince

**Condé**, LOUIS JOSEPH DE BOURBON, PRINCE OF (1736-1818), b. at Chantilly; only son of the Duke of Bourbon and the Princess of Hesse-Rheinfels. He distinguished himself in the Seven Years' War.

Condensed Milk. See Milk.

**Con' denser**, a syringe by which air is compressed into a receiver. Also a vessel in which aqueous or other vapors are condensed by cooling into the liquid form.

**Con'dor**, a South American bird, one of the largest of the Vulturidæ or vulturine birds. In its essential features it resembles the common vultures, differing from them mainly in the large cartilaginous carbuncle which surmounts its beak, and in the large size of its

### Condorset

oval and longitudinal nostrils placed almost at the extremity of the cere. Despite the many stories of its gigantic proportions, Humboldt met with no specimens whose wings exceeded 9 ft. in expanse, though it has occasionally been known to attain an expanse of 14 ft. It is found in greatest numbers in the Andes chain, frequenting regions from 10,000 to 15,000 ft. above the level of the sea. They are generally to be seen in groups of three or four, and only descend to the plains under stress of hunger, when they will successfully attack sheep, goats, deer, and bullocks. They prefer carrion, however, and, when they have opportu-



### Condor.

nity, gorge themselves until they become incapable of rising from the ground, and so become a prey to the Indians. The king vulture is another bird of the same genus.

**Condorset** (kon-dor-sä), MARIE JEAN ANTOINE NICOLAS DE CARITAT, MARQUIS DE (1743-1794), an eminent French writer. The merit of his work gained for him in 1769 a seat in the Academy of Sciences, of which, after the publication of his *Eloges des Académiciens morts arant 1699* (1773), he was appointed perpetual secretary (1777). In 1777 his *Theory of Comets* gained the prize offered by the Academy of Berlin; he enriched the *Transactions* of many learned societies, and took an active part in the *Encyclopédie*.

**Condottieri** (kon-dot-tē-ā'rē), an Italian name given to the captains of those bands of mercenary soldiers who, in the fourteenth and fifteenth centuries, hired themselves out to carry on the petty wars of the Italian states. Montreal d'Albarno, a gentleman of Provence, was the first to give definite organization to a lawless band of this kind, and many of them attained a considerable size and power. For the most part these mercenarics were good soldiers and splendidly equipped, but rapacious and cruel to all but their own class.

**Con' ductor** (or Lightning Conductor), an instrument by means of which either the elec-

### Confucius

tricity of the clouds, the cause of lightning, is conducted without explosion into the earth, or the lightning itself is received and conducted quietly into the earth or water without injuring buildings, ships, etc. It was invented by Benjamin Franklin about 1752, and met with speedy general adoption. It usually consists of a stout iron rod with one or more points at the top, the lower end being metallically connected with thick strips of copper which are carried into the ground to a considerable depth and terminated, if possible, in water or in wet earth.

**Cone**, as used in geometry, generally means a right circular cone, which may be defined as the solid figure traced out when a right-angled triangle is made to revolve round one of the sides that contain the right angle.

**Cone**, in botany, a dry compound fruit, consisting of many open scales, each with two seeds at the base, as in the conifers; a strobilus.

**Concy Island,** a popular resort situated at the southwestern end of Long Island, in New York. It is historical as the place of Henry Hudson's landing in 1609. All parts of the island are reached by railroad lines from New York City, Jersey City, and Brooklyn. It was annexed to Brooklyn in 1894. During the summer months it is crowded with pleasure-seeking humanity from many parts of the country.

ing humanity from many parts of the country. Confederation of the Rhine, the league of Germanic states formed by Napoleon Bonaparte in 1806, and including Bavaria, Wurtemberg, Baden, Hesse-Darmstadt, the kingdom of Westphalia, etc.

**Confidential Communication,** in law a communication made by one person to another which the latter cannot be compelled to give in evidence as a witness. Generally all communications made between a client and his agent, between the agent and the counsel in a suit, or between the several parties to a suit. are treated as confidential. The privilege of confidentiality does not extend to disclosures made to a medical adviser, and in England it has been decided also that confessions made to a priest are not to be treated as confidential.

**Confisca' tion**, the act of condemning as forfeited, and adjudging to the public treasury, the goods of a criminal in part punishment of a crime.

Confu'clus (or Kong-fu-tse), that is, "the teacher, Kong" (B.c. 550-478), the famous Chinese sage; b. in the province of Shantung, then belonging in part to the small vassal kingdom of Lu. His father, Shuh-liang-heih, who was of royal descent, d. three years later, and the boy was reared in comparative poverty by his mother, Ching-tsai. At the age of seventeen he was made inspector of corn markets; at nineteen he married, and after about four years of domesticity, in which a son and two daughters were borne him, he commenced his career as a teacher. In 517 B.c. he was induced by two members of one of the principal houses in Lu, who had joined his band of disciples, to visit the capital with them, where he had interviews with Lao-tze, the founder of

Taouism. Though temporarily driven from Lu to Tsi by a revolution, he soon returned thither with an increased following, and at the age of fifty-two was made chief magistrate of the city of Chung-too. So striking a reformation was effected by him that he was chosen for higher posts, became minister of crime, and with the aid of two powerful disciples elevated the state of Lu to a leading position in the kingdom. Its marquis, however, soon after gave himself up to debauchery, and Confucius became a wanderer in many states for thirteen years. In 483 he returned to Lu, but would not take office. The deaths of his favorite disciples Yen Hwin and Tze-lu in 481 and 478 did much to further his own, which took place in the latter year. Confucius left no work detailing his moral and social system, but the five canonical books of Confucianism but the five canonical books of Confucianism are the Yih-king, the Shu-king, the Shi-king, the Le-king, and the Chun-tsien, with which are grouped the "Four Books," by disciples of Confucius, the Ta-hëo or Great Study, the Chung-Yung or Invariable Mean, the Tun-yu or Philosophical Dialogues, and the Hi-tse writ-ten by Meng-tse or Mencius. The teaching of Confusius has had and still has an imof Confucius has had, and still has, an im-mense influence in China, though he can hardly be said to have founded either a religion or a philosophy. All his teaching was devoted to practical morality and to the duties of man in this world in relation to his fellow men; in it was summed up the wisdom acquired by his own insight and experience, and that derived from the teaching of the sages of antiquity.

**Conger Eel** (kong'ger), a genus of marine eels characterized by a long dorsal fin beginning near the nape of the neck, immediately above the origin of the pectoral fins, and having the upper jaw longer than the lower. It is pale-



Conger Eel.

brown above, grayish-white below, with whitish dorsal and anal fins fringed with black. Its fiesh is eaten, but is somewhat coarse.

**Conglom' crate**, a term applied by geologists to rocks consisting mostly of water-worn pebbles cemented together by a matrix of siliceous, calcareous, or other cement, often called also *plum pudding stone*.

**Congo** (or Zaire), one of the great rivers of the world, in Southern Africa, having its embouchure in the South Atlantic. The mouth of the river was known to the Portuguese in 1485, but the lower part of its course was first explored by an English expedition under Captain Tuckey in 1816, which ascended it for about 172 mi. In 1867, however, Livingstone discovered a considerable river called the Chambezi, rising in the Chibalé Hills, and having followed it to Lake Bangweolo traced it thence as the Luapula to Lake Moero, and thence again as the Lualaba to Nyangwe. From this point its exploration was taken up in 1876-77 by Stanley, who proved its identity in 1870-77 by Stanley, who proved its identity with the Congo. It carries more water to the ocean than the Mississippi, its volume being next to that of the Amazon. Its total length is perhaps 3,000 mi. Its chief tributaries are the Aruwimi and the Mobangi from the right, and the Ikelemba and Kwa from the left, which latter represents the collected waters of immense rivers from the south, such as the Kassai, the Kwango, etc. It is navigable for about 110 mi. from its mouth, after which the navigation is interrupted by cataracts.

Congo Free State, a state recently founded on the river Congo, in Central South Africa, stretching by a kind of narrow neck of territory to the river's mouth, but expanding inland so as to cover an immense area, mainly lying south of the river. The obvious advantages of the Congo as a waterway in opening up the continent led to the formation at Brussels in 1878 of a Comité d Etudes du Haut Congo, under the patronage of Leopold II, having as its aim the internationalization and development of the Congo area. Under its auspices Stanley returned in 1879 (see preceding art.) to open up the river and form a free state under European auspices. He established a first station at Vivi, the limit of maritime navigation, 110 mi. above the mouth of the river, constructed roads past the Yellala and Livingstone cataracts, and hauled steamers up to the higher reaches of the Congo, where in 1882 the station of Leopoldville was formed on Stanley Pool. Of the 223 mi. between Vivi and Leopoldville only 88 are navigable water; but from the latter station to Stanley Falls the Congo itself is continuously navigable for 1,000 mi., to which its great affluents already explored add no fewer than 5,000 mi. of serviceable waterway. Above the Stanley Falls station (destroyed by Arab slave dealers in November, 1886) the river is again navigable for a distance of 385 mi. to Nyangwe, which is about 1,300 mi. from the Chambezi sources. The work having been thus initiated by Stanley, and the feasibility of the project made manifest, the association in 1884-85 entered into treaties with all the European powers and the U.S. for the recog-nition of its sovereign power. The boundaries of the new Congo Free State were settled at the same time, it being agreed that the basin of the Congo and its tributaries should be free to all nations, that no duties should be levied on imports, and that the slave trade should be suppressed. The central government is at

### Congress

Brussels, consisting of the king of Belgium as sovereign, and three departmental chiefs. Arrangements are being made for the construction of a railway past the falls obstructing navigation. A number of stations have been formed on the river, the chief of which is Boma, about 70 mi. from its mouth. The revenue at present largely consists of a subsidy from King Leopold. The exports forming the staple of present trade are palm oil, caoutchouc, ivory, orchilla, copal, groundnuts, camwood, wax, etc. Area estimated at 1,000,000 sq. mi.; pop. 27,000,000.

Congress, an assembly of the delegated representatives of sovereign states, for the purpose of considering matters of international interest. Even in America, though the term has now a different meaning, it had a similar origin, the first congress being that of the delegates from the various British colonies, who met Oct. 7, 1765, for the purpose of considering their griev-Previous to signing a treaty of peace, ances. a meeting of plenipotentiaries usually takes place, to which the name of a congress is sometimes applied, though it seems more properly to be reserved for those more important meetings at which extensive schemes of future policy are determined on. To this class belonged the famous Congress of Vienna in 1815; that of Carlsbad in 1819, for regulating the affairs of Germany; that of Paris at the end of the Russian War of 1854-56; and that at Berlin after the Russo-Turkish War of 1877-78. The word congress is often used interchangeably with conference. For U.S. Congress, see United States.

**Con'greve,** WILLIAM (1670-1729), English dramatist. His plays belong to the artificial school of comedy, which aimed rather at the production of a sustained flow of wit than at the precise delineation of character.

**Congreve,** SIR WILLIAM (1772-1828), English inventor of the Congreve rocket. He invented the rocket about 1804. It was first used in active service in the attack on Boulogne, 1806, and on Copenhagen, 1807. He took out patents also for the manufacture of gunpowder and of banknote paper, and wrote treatises on the mounting of naval ordnance and on the hydropneumatic lock. He died at Toulouse.

**Coni** (or Cu'neo), a town of North Italy, capital of the province of Coni. Formerly all merchandise passing from the seaport of Nice to Lombardy, Switzerland, and Germany went by this route, but the railway has confined its trade to Turin and neighboring towns. It has manufactures of silks and woolens. Pop. 12,413.

**Conic Sections,** three curves, the hyperbola, the parabola, and the ellipse, so called because they are formed by the intersection of the surface of a cone with planes that cut the cone in various directions. If the cutting plane be parallel to the axis the curve formed is the hyperbola (1); if parallel to the slope of the cone the curve is a parabola (2); if passing through both sides of the cone obliquely the section is an ellipse (3). A section perpendicular to the axis of the cone forms a circle (4), which may

### Connecticut

also be considered one of the conic sections. A perpendicular plane through the apex gives a triangle (5).

a triangle (5). **Conif** erse, the pines, firs, and their allies, a natural order of gymnospermous exogens, the essential character of which consists in the manner in which the ovules, not enclosed in an ovary, receive directly the action of the pollen without the intervention of a stigma. The ovules in these plants are borne on scales or modified leaves, which are spread out, not folded, and generally grouped in such a manner as to form a cone composed of a greater or smaller number of these leaves, of which only a portion may be fertile and bear ovules. The disposition of the ovules in relation to these scales permits of a division of the Coniferse into three distinct families or tribes.

**Conjev'eram, a** town of Hindustan, presidency of Madras, district of Chingleput. It possesses two famous pagodas dedicated to Vishnu and Siva, and the inhabitants are mostly Brahmans. Cottons are manufactured in the town. Pop. 37,275.

**Conjunc' tion,** in astronomy, the position of two of the heavenly bodies, as two planets, or the sun and a planet, when they have the same longitude (are in the same direction from the earth). When it is simply said that a planet is *in conjunction*, conjunction with the sun is to be understood. Superior conjunction and *inferior* conjunction are terms used of the planets whose orbits are nearer to the sun than that of the earth, according as the sun is between us and them, or they between us and the sun.

us and them, or they between us and the sun. Conkling, Roscoz (1829-1888), American statesman, b. in Albany, N. Y. In 1850 he became district attorney for Oneida county, and was made mayor of Utica in 1858. The same year he was chosen as a Republican to Congress and was re-elected in 1860, was defeated in 1862, but was re-elected in 1864. His first important speech was in support of the fourteenth amendment to the Constitution. He was re-elected in 1866, and in January, 1867, took his seat in the U.S. Senate, and was re-In 1881 he became elected in 1873 and in 1879. hostile to President Garfield's administration on a question of patronage, claiming, with his colleague, Thomas C. Platt, the right to con-trol federal appointments in his state. They finally resigned their seats in the Senate and appealed to the legislature of New York for a re-election as a vindication of their course, but they were unsuccessful, and Conkling resumed the practise of law in New York City. He de-clined the nomination of justice of the U.S. Supreme Court, offered by President Arthur, and practised law until his death.

**Connaught** (kon'ngt), the smallest of the four provinces of Ireland, situated between Leinster and the Atlantic; area 4,392,086 acres. It is divided into five counties—Galway, Mayo, Roscommon. Leitrim, and Sligo. Pop. 723,573.

**Connecticut** (kon-net'i-kut), a river, the west branch of which forms by treaty a part of the boundary between the U. S. and Canada. It rises on the north border of New Hampshire; forms the boundary between Vermont and New



Hampshire, passes through the west part of Massachusetts and the central part of Connecticut, and falls into Long Island Sound. It is navigable for vessels drawing from 8 to 10 ft. for about 300 mi. from its mouth, subsidiary canals, however, being required above Hartford; total length, 450 mi. It is famed for its shad fisheries.

**Connecticut**, one of the original thirteen states of the American Union; bounded by New York, Massachusetts, Rhode Island, and Long Island Sound; length, east to west, about 95 mi.; greatest breadth, north to south, about 72 mi.; area 4,990 sq. mi. The state lies on the south slope of the hilly regions of New England, with a general surface much diversified; there is, however, no land above 1,000 ft. in elevation. Besides the Connecticut, two other rivers flow from the north into Long Island Sound-the Housatonic and the Thames. The Connecticut is the largest river in New England, rising on the northern border of New Hampshire, 1,600 ft. above the sea, flowing s.s.w., separating Vermont and New Hampshire, crossing the western part of Massachu-setts, and central part of Connecticut, flowing s.s.e. below Middletown, and emptying into the Sound at Saybrook. Its length is more than 450 mi., with a width in Connecticut varying from 500 to 1,000 ft. It is navigable to Middletown (30 mi.) for vessels drawing 10 ft., and to Hartford (50 mi.) for those drawing 8 ft. The eastern part of the state is drained by the Thames, which is formed by the Yantic and Shetucket. It is navigable to Norwich. In the western part of the state is the Housa-To this place it is navigable for small tonic. vessels. Besides these large streams there are very many smaller ones, affording, in their rapid descent from the hills, an immense amount of water power. There are several well-defined ranges of hills. Of these the Housatonic hills are the most westerly, and extend along that river to the coast. The Green Mountain range, running south from Vermont, terminates near New Haven. The Blue Hills of Southington are a part of the Mount Tom range of Massachusetts, and lie between the Green Mountain range and the Connecticut River. On the eastern side of the river is a fourth range which the river crosses at Chatham. The mineral wealth of the state is considerable. Copper is found in the Sims-bury mines at Granby, and at Bristol. Iron Iron ore is found in great quantities in Salisbury, Kent, Sharon, Cornwall, and Canaan, and has been worked for 125 years. Limestone and marble of the very best quality are found at Canaan, Washington, and Milford. At Portland and Cromwell are the well-known immense quarries of freestone largely in demand for building. The excellent slate flagging from Bolton and Haddam is abundant in supply and in great demand. Granite, gneiss, hydraulic lime, tiling slate, clay, and sulphate of baryta are found in great quantities. There are are found in great quantities. There are over 100 mi, of deeply indented coast on the Sound (which measures 140 mi. by 24 mi.), af-fording excellent harbors. The chief of these

are Stonington, New London, Saybrook. New Haven, Bridgeport, and Fairfield. The harbor at New London is one of the best in the country, capacious, and never frozen over.

Climate. — The climate of the state, while very changeable, is very healthful,—the mortality being below the average of the other states. There is scarcely any spring season, but summer opens abruptly about May, and the cold weather begins in November. The winters with their keen n.w. winds, are severe, but the dryness of the air makes some compensation. The mean temperature of the year is  $48 \cdot F$ .

Vegetation.—Among the forest trees of Connecticut are pine, hemlock, white, yellow, and red oak, hickory, walnut, chestnut, butternut, tulip. beech, birch, ironwood, silver and red maple, ash, ełm, sassafras, wild cherry, red cedar, juniper, and a few shrubs and small trees. Wild fruits are grapes, beech, and sloe plums, crab apples, blackberries, cranberries, strawberries, etc. Among the agricultural products are corn, wheat, oats, barley, buckwheat, potatoes, tobacco, hay, clover seed, and grass seed.

Minerals.—The state ranks fourth in the production of granite. Iron ore has been mined for over 160 years. There are considerable quantities of copper, lead, nickel, and cobalt. Limestone and marble of the best quality are quarried.

Manufactures.—In manufacturing, the state ranks tenth in the Union. Manufacturing forms the leading industry of the state, and is of a greater variety than in any other state. The principal industries are rubber goods, hardware, clocks, paper, firearms, carriages, cotton goods, woolen and silk fabrics, machinery, hosiery, furniture, sewing machines, saddlery, pianos, tools, buttons, and pins. Excellent water power is furnished by the numerous rivers.

Education.—The value of school property is estimated at about \$6,000,000, which does not include several private schools. The institutions of higher learning are Yale University, founded in 1701; Trinity College; and Wesleyan University. There are 180 public libraries, with over 700,000 volumes. There is an agricultural college at Mansfield, established in 1881. The state institutions include the state prison, hospital for the insane, school for boys, blind asylum, two schools for deaf mutes, and a school for imbeciles.

History. — Connecticut was one of the original thirteen states and ratified the U. S. Constitution in 1788, being the fifth colony to do so. She took an active part in the War of 1812. The present constitution was adopted in 1818, doing away with slavery. During the Civil War the state took a very prominent part. The population in 1800 was 746,258, ranking twenty-ninth in the Union. The principal cities are Bridgeport, Danbury, Hartford (the capital). Meriden, New Britain, New Haven, Norwalk, Norwich, Stanford, and Waterbury. *Governors.*—Matthew Griswold, 1784; Samuel Huntington, 1786; Oliver Wolcott, 1796; Jonathan Trumbull, 1798; John Treadwell, 1809; Roger Griswold, 1811; John Cotton Smith, 1813; Oliver Wolcott, 1818; Gideon Jomlinson, 1827; John S. Peters, 1831; Henry W. Edwards, 1833; Samuel A. Foote, 1834: Henry W. Edwards, 1835; Wm. W. Ellsworth, 1838; Chauncey F. Cleveland, 1842; Roger S. Baldwin, 1844; Isaac Toucey, 1846; Clark Bissell, 1847; Joseph Trumbull, 1849; Thomas H. Seymour, 1850; C. H. Pond (acting), 1853; Henry Dutton, 1854; William T. Miner, 1855; Alexander H. Holley, 1857; Wm. A. Buckingham, 1858; Joseph R. Hawley, 1866; James E. English, 1876; Marshall Jewell, 1869; James E. English, 1876; Marshall Jewell, 1871; Chas. R. Ingersoll, 1873; Richard D. Hubbard, 1877; Chas. B. Andrews, 1879; Hobart B. Bigelow, 1881; Thomas M. Waller, 1883; Henry B. Harrison, 1883; Phineas C. Lounsbury, 1887; Morgan G. Bulkeley, 1880; Luzon B. Morris, 1893; O. Vincent Coffin, 1895-97; L. A. Cooke, 1897.

**Connellsville**, Fayette co., Pa., on Youghiogheny River, 54 mi. s.e. of Pittsburg. Railroads: B. & O.; P. & L. E. Industries: tin plate mill, lock and hardware factory, two machine and car shops, two fire brick works, railroad shops, planing mills and flour mill. Coal, coke, and natural gas in vicinity; the center of the Connellsville coke region. Surrounding country agricultural and mineral. The town was first settled in 1770 by Zachariah Connell and became a borough in 1806. Pop. est., 1897, 10,000

**Connersville**, Fayette co., Ind., on west fork of White River, 67 mi. n.w. of Cincinnati. Railroads: White Water Valley; C. H. & D.; and Ft. W. C. & L. Industries: furniture factory, three flouring mills, three iron foundries, and two planing mills. The town was settled in 1788 and became a city in 1872. Pop. est., 1897, 7,500.

Co'non, an Athenian who had the command of a fleet in 413 B. C. to prevent the Corinthians from relieving Syracuse, then at war with Athens, and who, after various services, succeeded Alcibiades in 406.

**Con' rad II**, king of Germany and emperor of the Romans, reigned from 1024 to 1039, and is regarded as the true founder of the Franconian or Salic line.

**Conrad III,** king of Germany and emperor of the Romans from 1138 to 1152, was the founder of the Suabian dynasty of Hohenstaufen.

**Consanguin' ity**, the relation of persons descended from the same ancestor. It is either lineal or collateral—lineal between father and son, grandfather and grandson, and all persons in the direct line of ancestry and descent, from one another; collateral between brothers. cousins, and other kinsmen descended from a common ancestor, but not from one another.

**Conscience,** that power or faculty, or combination of faculties, which decides on the rightness and wrongness of actions; otherwise called the *Moral Sense*. Whewell defines it as "the reason, employed about questions of

### Consignment

right and wrong, and accompanied with the sentiments of approbation and condemnation, which, by the nature of man, cling inextricebly to his apprehension of right or wrong." See *Ethics*.

**Conshohocken**, Montgomery co., Pa., on Schuylkill River, 13 mi. n. of Philadelphia. Railroads: Phila. & Reading; and Pennsylvania. Industries: iron foundry, cotton mills, flouring mill, and factories for the manufacture of surgical instruments, tubes, and fences. Surrounding country agricultural. The town was first settled in 1682 and was incorporated as a borough in 1850. Pop. est. 1897, 6,500.

**Conserv'atives**, in British politics, the party that substantially corresponds to what used to be the Tory party, taking the opposite side to the *Liberals*. The name came into use about the time of the passing of the Reform Act of 1832, and is often used as implying greater enlightenment or liberality than *Tory*.

Conserv' atory, a name given to a systematic school of musical instruction. Conservatories were originally benevolent establishments attached to hospitals, or other charitable or religious institutions. In Naples there were formerly three conservatories for boys; in Venice four for girls; the Neapolitan group being reduced in 1818 to a single establishment under the name Royal College of Music. In Milan a conservatory was established in 1808. In France the musical school established in connection with the Opera received its final organization in 1795 under the name of Con-servatoire de Musique. The Conservatorium, founded at Leipsic in 1842 under the auspices of Mendelssohn, is perhaps the most influential in Germany. Institutions of the same description exist in Warsaw, Prague, Munich, Berlin, and Vienna, and in many American cities.

**Conservatory**, in gardening, a term generally applied by gardeners to plant houses, in which the plants are raised in a bed or border without the use of pots, the building being frequently attached to a mansion. The principles of their construction are in all respects the same as for the greenhouse, with the single difference that the plants are in the free soil, and grow from the floor instead of being in pots placed on shelves or stages. The distinction, however, is often overlooked.

**Consign ment**, a mercantile term which means either the sending of goods to a factor or agent for sale, or the goods so sent. The term is chiefly used in relation to foreign trade. The receivers of consignments have usually to keep magazines and stores, for the use of which their consigners are charged. The profits of a consigning agency often compare favorably with the occasionally larger but much less safe profits of original ventures. The consigning trade is protected by special laws. In most countries a consigner can claim his goods and collect all outstanding debts for goods sold on his account by a consignee who has suspended payment.

### Console

Con sole, in ar-

chitecture, a pro-

jecting ornament or bracket having

for its contour gen-

erally a curve of contrary flexure.

It is employed to

support a cornice, bust, vase, or the

like, but is fre-



quently used merely as an ornament.

**Con** sonant, a letter so named as being sounded only in connection with a vowel, though some consonants have hardly any sound even when united with a vowel. serving merely to determine the manner of beginning or ending the vowel sounds; as in ap, pa, at, ta. In uttering a consonant there is greater or less contact of some parts of the organs of speech; in uttering a vowel there is a want of such contact, the vocal passage being open though variously modified.

**Conspir acy**, in law, an offense ranked as a misdemeanor, and punishable by imprisonment and hard labor. It is constituted by a combination between several persons to carry into effect any purpose injurious either to individuals, particular classes, or the community at large. When the conspiracy leads to any overt act of an unlawful kind, the offense becomes felony.

**Con' stable**, ARCHIBALD (1774-1827), Scottish bookseller and publisher He was the original publisher of the *Edinburgh Review*, the poems of Sir Walter Scott, the *Waverly Novels*, the Supplement to the Encyclopædia Britannica, and other valuable works.

**Constable**, JOHN (1776-1837), English landscape painter. In 1819 his *View on the River Stour* procured him admission as an associate of the Academy. From this period his reputation widely extended itself, both over Britain and the Continent. His careful studies of landscape in respect of tone were of great influence in art.

**Con'stance**, a town of Germany, in Baden. The town has various branches of industry and a considerable trade. It was once a flourishing imperial city with three times its present population. Pop. 16,235.

**Constance**, LAKE OF, a lake. Central Europe, forming a reservoir in the course of the Rhine; area 207 sq. mi. **Constan tia**, a small district in Cape Colony

**Constan' tia**, a small district in Cape Colony a few miles from Cape Town, celebrated for its wine, made from vines brought originally from Persia and the Rhine, esteemed the best liquor wine after Tokay, and owing its special properties largely to the soil.

**Con'stantine**, a town in Algeria, capital of a province of same name. Both within the town and in the vicinity Roman remains abound. The manufactures consist chiefly of woolen and linen goods: the trade is in corn, linen, and wax. Pop. 46,581. **Con'stantine**, CAIUS FLAVIUS VALERIUS

**Con'stantine**, CAIUS FLAVIUS VALERIUS AURELIUS CLAUDIUS (274-337), Roman emperor, surnamed the *Great*, son of the Emperor Constantine Chlorus. After the death of his father he was chosen emperor by the soldiery, in the year 306. In 325 Constantine became the sole head of the Roman Empire. His internal administration was marked by a wise spirit of reform. In 329 he laid the foundation of a new capital of the empire, at Byzantium, which was called after him Constantinople, and soon rivaled Rome herself. In 337 he was taken ill near Nicomedia, was baptized, and died after a reign of thirty-one years, leaving his empire between his three sons, Constantine, Constantius, and Constans.

Constantine, PAULOVITCH (1779-1831), grandprince of Russia, second son of Paul I. He distinguished himself in 1799 under Suwarroff, and at Austerlitz in 1805; and in 1812, 1813, and 1814 attended his brother, the Emperor Alexander, in all his campaigns. He was afterward employed in superintending the affairs of the new kingdom of Poland, and was successively made military governor and generalissimo of the Polish troops. On the decease of his brother in 1825 he was proclaimed emperor at St. Petersburg, in his absence, but as he adhered to a previous renunciation of his claim to the throne, his younger brother, Nicholas, became Alexander's successor. He died, execrated by the Poles as one of their most barbarous oppressors.

Constantino'ple ("city of Constantine"), a celebrated city of Turkey in Europe, capital of the Turkish Empire, situated on a promontory jutting into the Sea of Marmora, having the Golden Horn, an inlet of the latter, on the n. and the Bosporus on the e. The city proper is thus surrounded by water on all sides except the w., where is an ancient and lofty double wall of four mi. in length, stretching across the promontory. On the opposite side of the Golden Horn are Galata, Pera, and other suburbs, while on the Asiatic side of the Bosporus entrance is Scutari. Occupying the extreme point of the promontory on which the city stands is the Seraglio or palace of the sultan, which, with its buildings, pavilions, gardens, and groves, includes a large space. At the principal entrance is a large and lofty gate, called Bab Humayum, "the high door" or "sublime porte," from which has been derived the well-known diplomatic phrase. Of the 300 mosques, the most remarkable are the royal mosques, of which there are about 15, esteemed the finest in the world. First among these is the mosque of St. Sophia, the most ancient existing Christian church, converted into a mosque in 1453 on the capture of the city by the Turks. Another magnificent mosque is that of Soliman; after which are those of the Sultana Valide, built by the mother of Mohammed IV, and of Sultan Achmet, the most conspicuous object in the city when viewed from the Sea of Marmora. The streets are mostly extremely narrow, dark, dirty, and ill paved, and exceedingly crooked and tortuous, but there has been a certain opening up and improvement in the last twenty years owing to the construction of tramways and the railway to Adrianople, which runsalong

## Constellations

the shore of the Sea of Marmora and past the Seraglio to the entrance of the Golden Horn. The numerous covered and uncovered bazars are severally allotted to particular trades and merchandise. Constantinople has but one remarkable square, called the At-Meidan, occu-pying the site of the ancient *Hippodrome*. There are about 130 public baths in the city, mostly of marble, of plain exterior, but handsome and commodious within. The numerous cemeteries, mostly outside the western wall, have become vast forests, extending for miles round the city and its suburbs. The few manufactures are chiefly confined to articles in morocco leather, saddlery, tobacco pipes, fez caps, arms, perfumes, gold and silver embroideries, etc. The foreign commerce is considerable. The harbor, the Golden Horn, which more resembles a large river than a harbor, is deep, well sheltered, and capable of containing 1,200 large ships, which may load and unload alongside the quays. It is about 6 mi. long, and a little more than half a mile broad at the widest part. Among the imports are corn, timber, cotton stuffs, and other manufactured goods. The exports con-sist of silk, carpets, hides, wool, goats' hair, valonia, etc. The suburb Galata is the prin-cipal seat of foreign commerce. Here are situated the arsenals, the dock yard, the artillery barracks, etc., extending along the Bosporus for nearly 14 mi. It is an ancient place. Pera occupies the more elevated portion of the promontory of which Galata forms the mari-time part. Both it and Galata have now much of the appearance of a modern European town. Top Haneh is situate a little farther up the Bosporus than Galata, of which it forms a continuation. It has a government foundry and arsenal for cannon. Constantinople occupies the site of the ancient Byzantium, and was named after Constantine the Great, who rebuilt it about A.D. 330. It was taken in 1204 by the Crusaders, who retained it till 1201; and by the Turks under Mohammed II, May 29, 1453—an event which completed the extinction of the Byzantine Empire. Pop. 874,926.

Constella tions are the groups into which astronomers have divided the fixed stars, and which have received names for the convenience of description and reference. It is plain that the union of several stars into a constellation, to which the name of some animal, person, or inanimate object is given, must be entirely arbitrary, since the several points (the stars) may be united in a hundred different ways, just as imagination directs. The grouping adopted by the Egyptians was accordingly modified by the Greeks, though they re-tained the Ram, the Bull, the Dog, etc.; and the Greek constellations were again modified by the Romans, and again by the Ara-At various times, also, Christianity bians. has endeavored to supplant the pagan system, the Venerable Bede having given the names of the twelve apostles to the signs of the zodiac, and Judas Schillerius having, in 1627, applied Scripture names to all the constellations. Weigelius, a professor of Jena, even grouped the stars upon a heraldic basis, introducing the arms of all the princes of Europe among the constellations. The old constellations have, however, been for the most part retained. Ptolemy enumerated fortyeight constellations, which are still called the *Ptolemæan*. The different stars of a constellation are marked by Greek letters, a denoting those of the first magnitude,  $\beta$  those of the second, and so on. Stars of the sixth magnitude are the smallest visible to the naked eye. Several stars have also particular names.

**Constitution**, the fundamental law of a state, whether it be a written instrument of a certain date, or an aggregate of laws and usages which have been formed in the course of ages. The ideal constitution is that established by a free sovereign people for their own regulation, though the expediency of other forms at various stages of national development cannot but be recognized. The chief of these are: 1, Constitutions granted by the plenary power of absolute monarchs. 2, Those formed by contract between a ruler and his people, the contract being mutually binding. 3, Those formed by a compact between different of the set of a solute monarchs.

In regard to political principles, constitutions are: 1. Democratic, when the fundamental law guarantees to every citizen equal rights, protection, and participation, direct or indirect, in the government, such as the constitutions of the U.S. and of some cantons of Switzerland. 2, Aristocratic, when the constitution recognizes privileged classes, as the nobility and clergy, and intrusts the government entirely to them, or allows them a very disproportionate share in it. Such a constitution was that of Venice, and such at one time those of some Swiss cantons, for instance, Bern. 3, Of a mixed character. To this latter division belong some monarchical constitutions, which recognize the existence of a king whose power is modified by other branches of government of a more or less popular cast.

Con'sul, a name originally given to the two highest magistrates in the republic of Rome. After King Tarquinius Superbus had been expelled by the joint efforts of the patricians and plebeians (509 B.C.), two consuls were placed at the head of the senate. These officers were annually elected, at first only from the patricians; at a later period also from the plebeians. In order to be eligible to the consulship, the candidate was to be forty-five years of age, and must have passed through the inferior offices of quæstor, ædile, and prætor, and he was required by law to be in Rome at the time of the election. All these laws, however, were disregarded at various junctures in Roman history. The insignia of the consuls were a staff of ivory with an eagle at its head, a toga bordered with purple, which under the emperors was embroidered; an ornamental chair, and twelve *lictors*, who, with *fasces* and **axes**, pre-ceded them. In the beginning of the republic the authority of the consuls was almost as great as that of the preceding kings. They

## Consumption

could declare war, conclude peace, make alliances, and even order a citizen to be put to death; but their powers were gradually curtailed, especially by the establishment of the tribunes of the people, early in the fifth century. But they still stood at the head of the whole republic; all officers were under them, the tribunes of the people only excepted; they convoked the senate, proposed what they thought fit, and executed the laws. In times of emergency they received unlimited power, and could even sentence to death without trial, levy troops, and make war without the resolve of the people first obtained. Under the emperors the consular dignity sunk to a shadow, and became merely honorary. The last consul at Rome was Theodorus Paulinus (A. D. 536).

In France the name of consul was temporarily adopted for the chief magistrates after the revolution. The directorial government (third constitution) having been abolished by the revolution of the Eighteenth Brumaire, of the year VIII (Nov. 9, 1799), a provisional consular government, consisting of Bonaparte, Siéyès, and Roger Ducos, established the fourth constitution, proclaimed December 15, by which France was declared a republic under a government of consuls. Three elective consuls (Bonaparte, Cambacérès, Lebrun) had almost uncontrolled executive authority, while the legislative power was in the hands of the tribunate and the legislative assembly; a conservative senate was also elected. But as early as Aug. 2, 1802, Bonaparte was proclaimed first consul for life, and thus the constitution of France became again practically monarchical. On April 10, 1804, he was proclaimed emperor, and even the nominal consulate ended.

At present consuls are officials appointed by the government of one country to attend to its commercial interests in seaports or other towns of another country. The duties of a consul generally speaking are to promote the trade of the country he represents; to give advice and assistance when called upon to his fellow subjects; to uphold their lawful interests and privileges if any attempt be made to injure them; to transmit reports of trade to his own government, to authenticate certain documents, etc. They are generally of three ranks; consuls, general consuls, and vice consuls.

**Consumption,** in political economy, all use or expenditure of the products of industry or of things having an exchangeable value. It is usually characterized as productive or unproductive, according as it does or does not conduce to the efficiency of a producer and to further production. Thus wealth in the form of machinery is consumed productively by wear and tear in the processes of production; and, similarly, wealth expended in improving land is productively consumed; but the wealth expended in the maintenance of an operatic artist is, from the ordinary point of view, unproductively consumed. The classification, however, is not of a very definite kind, the distinction lying for the most part in the degree of directness and obviousness with which

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the act of consumption is related to production. Hence in the case of the operatic artist it is sometimes urged that the recreative benefit conferred upon the community tends indirectly to increase efficiency in production, and that from this point of view the artist consumes productively. So the expenditure of wealth in war, or in preparations for war, usually classed as unproductive, may be really productive consumption, as tending to the assurance of the producer in the stability of the commercial conditions. The perfect characterization of an act of consumption as productive or unproductive involves the consideration of elements of a frequently incommensurable kind, and the rough, practical economic test has to be employed with some amount of reservation. Consumption is the end of all production: and as the demand of the consumer determines the employment of the various coefficients of production,-land, labor, and capital, - it is urged by many later economists that the scientific treatment of economics should proceed from consumption to production, instead of from production to consumption in accordance with the method of the older economists. Too much stress may be laid upon this method, but the consideration of economic problems from the standpoint of the consumer is of advantage, as giving the social need, rather than the producer's profit, the prior claim upon the attention.

**Contempt'**, an offense against the dignity, order, or authority of a court or legislative assembly. Contempts committed out of court may be punished by fine or imprisonment; contempts done before court are usually punished by commitment or flue. The power of vindicating their authority against contempt is incident to all superior courts.

**Content** and **Noncontent** are the words by which assent and dissent are expressed in the House of Lords. Aye and No are used in the House of Commons.

Continent'al System, a plan devised by Napoleon to exclude Britain from all intercourse with the continent of Europe. It began with the decree of Berlin of Nov. 21, 1806, by which the British Islands were declared to be in a state of blockade; all commerce, intercourse, and correspondence were prohibited; every Briton found in France, or a country occupied by French troops, was declared a prisoner of war; all property belonging to Britons, fair prize, and all trade in goods from Britain, or British colonies entirely prohibited. Britain replied by orders in council prohibiting trade with French ports, and de-claring all harbors of France and her allies subjected to the same restrictions as if they were closely blockaded. Further decrees on the part of France, of a still more stringent kind, declared all vessels of whatever flag. which had been searched by a British vessel or paid duty to Britain, denationalized, and directing the burning of all British goods, etc. These decrees caused great annoyance, and gave rise to much smuggling, till annulled at the fall of Napoleon, 1814.

#### Contour

**Contour** (kon'tör), an outline. In geodesy contours, or contour lines, are lines or levels carried along the surface of a country or district at a uniform height above the sea level, and then laid down on a map or plan, so that an approximately true outline of its contour is presented, the degree of accuracy depending on the number of lines or levels taken between the sea level and the highest point in the region.

**Con'traband**, in commerce, all goods and wares exported from or imported into any country against the laws of said country. There are, also, a number of articles termed *contraband of war* which neutrals may be prevented, by one belligerent, from carrying to another.

**Con' tract.** in law an agreement or covenant between two or more persons, in which each party binds himself to do or forbear some act, and each acquires a right to what the other promises. Contracts may be in express terms or implied from the acts of the parties; they may be verbal or written, and at common law both forms are binding; but by statute law a promise must be in writing. The law of contract occupies so large a space in all civilized systems of law that only a few of its more leading principles can be conveniently stated here. There is a general harmony in the jurisprudence of modern nations on this subject which is not to be found in other departments of law. The following definitions fully explain the character an 1 meaning of the term contract:-

1. When one person signifies to another his willingness to do or abstain from doing anything with a view to obtaining the assent of that other to such act or abstinence, he is said to make a proposal.

2. When the person to whom the proposal is made signifies his assent thereto, the proposal is said to be accepted. A proposal when accepted becomes a promise.

3. The person making the proposal is called the promiser, the person accepting the proposal the promisee.

4. When at the desire of the promiser the promisee or any other person has done or abstained from doing, or does or abstains from doing, or promises to do or abstain from doing something, such act or abstinence or promise is called the consideration for the promise.

5. Every promise and every set of promises forming the consideration for each other is an agreement.

6. Promises which form the cousideration or part of the consideration for each other are called reciprocal promises.

7. An agreement not enforceable by law is said to be void.

8. An agreement enforceable by law is a contract.

9. An agreement which is enforceable by law at the option of one or more of the parties thereto, but not at the option of the other or others, is a voidable contract.

10. A contract which ceases to be enforceable by law becomes void when it ceases to be enforceable.

#### Conway

Certain classes of persons are under peculiar disabilities in matters of contract, viz., infants, lunatics, and married women. 1, As a general rule at common law contracts made by an infant (a person under twenty-one years) are voidable unless they are in some way for his benefit, and in particular for "necessaries." The protection of infants has been extended by the court of chancery to "expectant heirs, as they are called, i. e., persons who borrow money on the credit of their expectations. 2, A married woman, being in the eye of the law merged in her husband, cannot bind herself by contract. 3, Contracts made by a lunatic are voidable, except where his state of mind was not known to the other contracting party. The principle is extended to corporations is ness. The general rule as to corporations is that they can only make binding contracts under their common seal, excepting in cases of "convenience almost amounting to neces-

sity." See Corporations. The contract must be founded on a consideration either of money or some act whereby an undoubted advantage accrues to the party sued. Lastly, the contract is voidable, if obtained by fraud, mistake, or compulsion.

**Contrac**'tions, abbreviations employed with the view of saving labor in writing, and also in former times with the view of saving parchment in extending MS. copies of works, deeds, etc. Contraction takes place in several modes, as by elision; writing a smaller letter above the word contracted; running two or more letters into one character; by symbols representing syllables or words, and by initial letters.

**Contral 'to,** in music, the highest voice of a male adult, or the lowest of a woman or a boy, called also the *Allo*, or when possessed by a man *Counter tenor*. It is next below the treble and above the tenor, its easy range being from tenor G to treble C.

**Co'nus**, a genus of gasteropodous mollusks, the type of the family Conidæ or cone shells, so named from the conical form of the shell. They are found in the southern and tropical seas.

**Convol'vulus,** a genus of plants, consisting of slender, twining herbs with milky juice, bell-shaped flowers, and five free stamens. Some species are commonly known as bindweeds; others are cultivated in gardens. Minor convolvulus, with its large flowers of violet blue, with white and yellow center, is a familiar species. Scammony is obtained from the root of the *Convolvilus Scammonia*, a native of Syria. Some species, like the sweet potato. have tuberous and fleshy roots capable of being used as food.

**Conway** (or Aberconway), a town of North Wales, in Carnarvonshire, about 13 mi. e.n.e. of Bangor. It is notable for its old castle built by Edward I, a suspension bridge built by Telford, and a tubular railway bridge by Stephenson. Pop. 7,246. The river Conway has a course of about 30 mi. through much romantic scenery.

Conway, HUGH, the nom de plume of Frederick John Fargus, (1847-1875), British novelist.

In 18"4 he wrote a dramatic story, *Called Back*, of which half a million copies were sold.

**Conway,** MONCURE DANIEL, an American clergyman, b. in Virginia, March 17, 1832, became at flist a Methodist, and about 1856 a Unitarian. He was a strong opponent of slavery. For many years (1863-1884) he preached or lectured at South Place chapel, London, and wrote on political, social and religious subjects in the liberal press.

**Cony** 'za, a genus of plants, natural order Compositæ, annual or perennial herbs, scattered over the warmer regions of the earth, a few being found in temperate countries. None possess properties of any value.

possess properties of any value. **Cooch Behar**' (or Kuch Behar'), a native state in India, in political relation with the government of Bengal. Area 1.307 sq. mi; pop. 602,624. The chief town, Cooch-Behar, contains some handsome public buildings and a splendid new palace of the Maharajah. Pop. 9.535.

**Cook**, ELIZA (1818-1889), British poetess. About 1840 she published a volume of domestic poems, and later established *Eliza Cook's Journal*. She was a favorite of the English middle class, and wrote verses such as *The Old Arm Chair*, etc.

**Cook, JAMES** (1728-1779), a famous British navigator, b. in Yorkshire. In 1755 he entered the royal navy, and four years later as sailing master of the Mercury performed valuable services in surveying the St. Lawrence River and the coast of Newfoundland. Some observations on a solar eclipse, communicated to the Royal Society, brought him into notice, and he was appointed commander of a scientific expedition to the Pacific, with the rank of lieuten-ant in the navy. During this expedition he successively visited Tahiti, New Zealand. discovered New South Wales, and returned by the Cape of Good Hope to Britain in 1771. In 1772 Captain Cook, now raised to the rank of a commander in the navy, commanded a second expedition to the Pacific and Southern Oceans, which resulted like the former in many interesting observations and discoveries. He re-turned to Britain in 1774. Two years later he again set out on an expedition to ascertain the possibility of a northwest passage. On this voyage he explored the western coast of North America, and discovered the Sandwich Islands, on one of which, Hawaii, he was killed by the natives.

**Cook**, JOSEPH, an American preacher, b. in Ticonderoga, N. Y., Jan. 26, 1838; graduated at Harvard in 1865. He became well known as a preacher and lecturer.

**Cookery**, the preparation of food so as to render it more palatable and more digestible. The art is of great importance, not only for comfort but also for health. Food is mainly prepared by submitting it to the action of fire. as by roasting, boiling, stewing, etc. These processes give each a different flavor to food, but result alike in rendering the tissues, both of animal and vegetable food, softer and much more easily dealt with by the digestive organs. The art of cookery was carried to considerable perfection among some of the ancient nations. as for instance the Egyptians, Persians, and Athenians. Extravagance and luxury at table were notable features of Roman life under the empire. Among moderns the Italians were the first to reach a high degree of art in this department. Their cooking, like that of the ancient Romans, is distinguished by a free use of oil. Italian cookery seems to have been transplanted by the princesses of the house of Medici to France, and was carried there to perhaps the highest degree of perfection; even yet the skill and resource which the French cook shows in dealing often with very slight materials is a highly creditable feature in the domestic economy of the nation.

**Cook's Inlet**, an inlet of the North Pacific Ocean, running into the Territory of Alaska for about 150 mi.; explored by Captain Cook in 1778.

**Cook's Islands**, a name of the Hervey Islands, given to them because discovered by Captain Cook.

**Cook's Strait**, the channel which separates the two principal islands of New Zealand, discovered by Captain Cook in 1770.

**Coolers**, WATER, vessels of porous, unglazed earthenware, in which a liquid can be kept cool by constantly exuding through the substance of the ware and evaporating from the outer surface of the vessel.

**Cooley**, THOMAS MCINTYRE, b. at Attica, N. Y., Jan. 6, 1824. He removed to Michigan and was admitted to the bar of that state in 1845. In 1859 he became professor, and subsequently dean of the faculty of the law department of the University of Michigan. In 1864 he was appointed to the state supreme bench, and in 1867 was elected chief justice. In 1890 he was placed at the head of the interstate commerce commission. Cooley is recognized as high authority on constitutional law. His work on torts is used as a text-book in many of the law schools. He is still a member of the faculty of the University of Michigan.

**Coom'assle**, a town, West Africa, capital of Ashantee, 130 mi. n. of Cape Coast Castle. It was taken and burned by Sir Garnet Wolseley, at the head of the English expedition sent against the Ashantees in 1874. Pop. about 50,000.

**Coombs**, LESLIE (1793-1881), American soldier. On June 2, 1813; he was made captain of spies in a regiment of Kentucky volunteers. In 1836 during the Texas struggle with Mexico, he raised a regiment of volunteers. In succession he became state auditor, and for several terms was elected to the legislature. When the war with Mexico began, he was active in raising volunteers in Kentucky. In 1860 he was chosen clerk of the Kentucky court of appeals. During the Civil War General Coombs was ardently devoted to the cause of the Union. He was a convincing sneaker.

of the Union. He was a convincing speaker. **Cooper**, SIR ASTLEY PATSON (1768-1841), English surgeon, was b. in Norfolk. He studied medicine in London, and attended the lectures of John Hunter. In 1794 he was ap-
pointed professor of anatomy at Surgeon's Hall, and in 1800 head surgeon of Guy's Hospital. In 1822 appeared his great work on *Dislocations and Fractures*. Shortly after he became president of the Royal College of Surgeons.

Cooper, JAMES FENIMORE (1789-1851), American novelist, b. at Burlington, N. J., studied at Yale College, and entered the American navy as a midshipman at the age of sixteen. In 1821 appeared the novel of *Precaution*, the first production of his pen. Though successful it gave no scope for his peculiar powers, and it was not till the production of the Spy and the *Pioneers* that he began to take a high place among contemporary novelists. After that came a steady flow of novels dealing with life on the sea and in the backwoods, most of which, like the Pilot, Red Rover, Waterwitch, Pathfinder, Deerslayer, and Last of the Mohicans, are familiar names to the novel-After visiting Europe and reading public. serving as consul for the U.S. at Lyons for three years, Cooper returned to America where he d. at Cooperstown, N. Y.

**Cooper**, MYLES (1735-1785), English clergyman. He graduated at Oxford in 1760. In 1762 he came to America as an assistant to President Johnson, of King's College. where he became professor of mental and moral philosophy. In the year following he became president.

Cooper, PETER (1791-1883), American inventor, manufacturer, and philanthropist, b. in New York City. In 1808 he was apprenticed to John Woodward, a carriagemaker, and while with him invented a machine for mortising the hubs of carriages, which proved of great value to his employer. His business ceased to be successful after the conclusion of peace with Great Britain, in 1815, and he attempted the trade of cabinetmaking, the grocery business, and the manufacture of glue; for the latter he leased a factory for twentyone years, and in addition to glue, made oil, prepared chalk, whiting, and isinglass. Subsequently he bought ten acres of land in Brooklyn, where the business has since continued. In 1828, he bought 3,000 acres of land in Baltimore, where he erected the Canton During the excitement over the iron works. building of the Baltimore & Ohio Railroad in 1830, he constructed from his own designs the first locomotive engine ever made in this country, the Tom Thumb, by which means the possibility of building railroads with little capital was demonstrated, and the Baltimore & Ohio Railroad was saved from bankruptcy. Soon after this he sold his iron works in Baltimore, and returning to New York built an iron factory, which he afterward turned into a rolling mill. In 1845 he removed his works to Trenton, N. J., and built three blast furnaces in Phillipsburg, the largest then known, bought the Andover iron mines, and built a railroad through the eight miles of country to bring the ore to his furnaces. He was president of the New York, Newfoundland & London Telegraph Company, the laying

of the Atlantic cable having been accomplished largely by his efforts and liberality. He bought the property at the intersection of Third and Fourth avenues, between Seventh and Eighth streets, and built here from his own plans the Cooper Union for the advancement of science and art. During the financial agitation in the U. S. following the crisis of 1873, he was active in the Greenback movement. In 1876, the National Independent party nominated him for president of the U.S.

**Cooperation**, a term in social economics, which, though of generic significance in the science of industry and trade. has a specific and technical sense, implying the association of any number of individuals or societies for mutual profit, whether in the purchase and distribution of commodities for consumption, or in the production of commodities, or in the borrowing and lending of capital among workmen.

The most powerful coöperative force in the industrial system is what economists have termed "the division of labor," but that is in reality also a union and graduation of labor toward productive ends, and has its counterpart in the multiform divisions of capital in its application to the maintenance and extension of industry.

Coöperation, as technically understood, occupies a middle position between the doctrines of the communists and socialists on the one hand, and the private property and freedom of individual labor and enterprise on the other. It takes its departure from communism at a very definite and significant point. While the latter would extinguish the motive of individual gain and possession in the sentiment of a universal happiness or good, and remodel all existing rights, laws, and arrangements of society on a basis deemed consonant to this end, coöperation seeks, in consistency with the fundamental institutes of society as hitherto developed, to ameliorate the social condition by a concurrence of increasing numbers of associates in a common interest.

The cooperative societies, springing from this idea, though attended with the most varied fortune, have greatly increased in number and in amount of business in recent years. The form, particular objects, and organic rules of these associations are by no means uniform. But they may be divided into three general classes: 1, Societies of consumption, the object of which is to buy and sell to members alone, or to members and non-members under differing conditions, the necessaries of life or the raw materials of their industry; 2, societies of production, the object of which is to sell the collective or individual work of the members: 3, societies of credit or banking. the object of which is to open accounts of credit with their members, and advance them loans for industrial purposes. There are numerous modifications of the principle, such as friendly societies, burial societies, societies of workmen which undertake the execution of work by contract. arrangements of private firms by which the workmen share in the

profits of the employers, and building societies. now rife in most large towns, the object of which is to enable members to become owners But the above three catof dwelling houses. egories define the distinguishing characteristics of the coöperative society proper. There are many cooperative societies in America. The Pillsbury flour mills of Minneapolis is the largest cooperative mill in this country. France, Germany, and England have numerous cooperation stores and factories. The Bon Marche in Paris is a coöperative store. In the U.S. cooperation has chiefly taken the form of building-loan associations for providing the members with houses of their own.

**Cooper's Creek** (or the Barcoo), called by the latter name chiefly in its upper course, the largest inland river of Australia, which rises in Queensland by two branches, the Thomson and Victoria (or Barcoo), and flows southwest to Lake Eyre.

**Co-ordinates,** in geometry, a term applied to lines, to which points under consideration are referred, and by means of which their position is determined. Co-ordinates either determine the position of a point in space or in a plane which is understood to contain all the figure under consideration. They determine position by straight lines only, or by a straight line and angles; in the latter case they are called *polar* co-ordinates. When co-ordinates are at right angles to each other they are called *rectangular* co-ordinates, and when they make any other angle with each other they are called *oblique* co-ordinates.

**Coorg** (or Kurg), a province in Southern Hindustan. Area 1,583 sq. mi.; pop. 173,055. The country has a healthy climate, and yields coffee, spices, timber, etc. The capital is Merkara.

**Coot**, a grallatorial bird of the rail family frequenting lakes and ponds. The common



Common Coot.

coot has a bald forehead, a black body, and lobated toes, and is about 15 in. in length. The nests, which are very large, strong, and compact, are composed of reeds and rank waterherbage, built sometimes near the water's edge, and sometimes on small islets at some distance from the shore. The coot of India, China, and Japan is said to be identical with that of Europe, but the North American coot is now recognized as a distinct species.

**Copaiba** (Copaiva) (ko-pā'ba, ko-pā-va), the name of a balsam and an oil. The balsam is a liquid resinous juice flowing from incisions made in the stem of a plant, and several other species of the genus, growing in Brazil, Peru, etc. It consists of several resins dissolved in a volatile oil. The resins are partly acid and partly neutral; the oil is clear, colorless, and has an aromatic odor.

, Co'pal is a gum-resin yielded by different trees in Africa, South America, India, and Australia, and differing considerably in its qualities according to its origin; but in general it is hard, shining, transparent, and citroncolored. When dissolved in alcohol or turpentine it makes a beautiful and very durable varnish. It resembles copal resin in color and odor.

**Copan'**, a ruined city of Central America, Honduras, on the Copan River, with some remarkable remains.

**Cope**, EDWARD DRINKER (1840-1897), American scientist. He graduated from the University of Pennsylvania and studied comparative anatomy in the Academy of Science, Philadelphia, the Smithsonian Institution, Washington, D. C., and in Europe. He was appointed professor in natural science in Haverford College in 1866, and afterward accepted that professorship in his alma mater. He was for a long time secretary and curator of the Academy of Natural Sciences, Philadelphia. He was a member of the Geological Society of France and the American Association for the Advancement of Science.

Copenha' gen, the capital of Denmark, on the Sound, the larger and older portion of it on the east side of the island of Zealand, a smaller portion on the north point of the island of Amager, with between them a branch of the sea forming the harbor. It has a citadel and several strong forts protecting it on the sea side: and is mostly well built, principally of brick. It has many buildings of interest. It has occasionally suffered much from fires and from hostile attacks, the most disastrous being the bombardment by the British from the 2d to the 5th of September, 1807. In 1801 the Danish fleet was here defeated by Sir Hyde Parker and The environs in some parts are very Nelson. Pop. 312,859. fine.

**Copep' oda**, an order of minute entomostracous fresh-water and marine crustacea, so named because their five pairs of feet are mostly used for swimming.

**Coper'nicus** (or Koppernigk), NICHOLA (1473-1543), a famous astronomer b. at Thorn, Poland. Having studied medicine at Cracow, he afterward devoted himself to mathematics and astronomy, and in 1500 taught mathematics at Rome with great success. Returning to his own country he was made a canon in the cathedral of Frauenburg, and began now to work out his new system of astronomy. Doubting that the motions of the heavenly bodies could be so confused and so complicated as the Ptolemaic system made them, he was induced to

38

consider the simpler hypothesis that the sun was the center round which the earth and the other planets revolve. Besides this fundamental truth Copernicus anticipated, for he can scarcely be said to have proved, many other of the principal facts of astronomical science, such as the motion of the earth round its axis, the immense distance of the stars which made their apparent position the same from any part of the earth's orbit, etc. The great work in which Copernicus explained his theory was completed in 1530, and published at Nuremberg in 1543. He was excommunicated by the pope on account of it.

**Co'ping,** the top or upper covering of a wall made to project and slope so as to carry the rain-water clear of the wall.

**Cop'ley,** JOHN SINGLETON (1737-1815), was b. in Boston, Mass., and d. in London, where he settled in 1776, and acquired a reputation as a historical painter. He was elected a member of the Royal Academy in 1779. His most celebrated picture is the *Death of Lord Chat*ham, now in the National Gallery.

Cop per, one of the most anciently known metals, deriving its name from Cyprus, large supplies having in Greek and Roman times come from that island. It is a metal of a pale red color tinged with yellow. Next to gold, silver, and platinum it is the most ductile and malleable of metals; it is more elastic than any metal except steel, and the most sonorous of all except aluminum. Its conducting power for heat and electricity is inferior only to that It has a distinct odor and a nauseof silver. ous metallic taste. It is not altered by water but tarnishes by exposure to the air, and becomes covered with a green carbonate. It occurs native in branched pieces, dendritic, in thin plates, and rarely in regular crystals, in the primitive and older secondary rocks. Blocks of native copper have sometimes been got weighing many tons. Its ores are numer-ous and abundant. Of these several contain sulphur and iron or other metal, such as copper-glance or vitreous copper. gray copper or Fahlerz, one of the most abundant and important ores, and copper pyrites or yellow cop-per, another abundant ore. The red oxide of copper forms crystals of a fine red color, and is used for coloring glass. There are two native carbonates, the blue and the green, the latter being the beautiful mineral malachite, the former also known as blue malachite. Blue vitriol is a sulphate, and is used for dyeing and preparing pigments, as are various other copper compounds. All the compounds of copper are poisonous. It is found in most European countries, in Australia and Japan, in Africa and in North and South America (especially in the vicinity of Lake Superior).

In extracting the metal from pyrites by the wet process, the ore is first roasted to get rid of the larger proportion of sulphur, then the calcined residue still containing sulphur is mixed with common salt, ground, and heated in ovens. The copper is thus converted into chloride, part of which volatizes, but is condensed along with arsenic and other substances, by passage through flues and water condensers. After some hours the calcined mixture is raked out of the ovens, cooled, and transferred to tanks, where it is exhausted by successive treatment with water. The solution, containing chloride of copper, sulphate and chloride of sodium, and iron salts, is next heated along with scrap-iron. Copper precipitates in the form of a ruddy, lustrous, tolerably compact mass, with a crystalline appearance, and mixed with metallic iron and oxide. The larger pieces of iron are picked out, the precipitate washed and drained, and then rendered compact by heating in a furnace. A slag containing the oxide of iron forms, and the copper, when judged sufficiently pure, is run into molds. Afterward this crude metal is refined and toughened in the usual way, and the slags are employed as in the Welsh process. Some of the alloys of copper, especially those containing tin and zinc, are of considerable importance, e. g., bronze, an alloy of copper with about 8 or 10 per cent. of tin; bell-metal composed of 80 parts of copper and 20 of tin; British bronze coinage, copper 95, tin 4, zinc 1. Copper is applied to a great many useful purposes. In sheets it is used for sheathing the bottoms of ships, covering roofs and domes, the constructing of boilers and stills of a large size. It is also used in electrotyping and engraving, for various household utensils and fittings; but its use for household utensils is by no means free from danger on account of the action of acids on it, which produces verdigris. About half the copper mined in the world is taken from the copper mines of the U.S. The proportion of pure copper to copper ore is largest in the American mines. Once about two thirds of the American copper mined was required for local consumption, and the balance was exported mostly to England, France, and Belgium. It is remarkable that although copper as money, except in small denominations, is no longer in general use, the consumption of this metal, once used for money chiefly, is more than eight times as great as it was forty years ago. This is in great measure explained by the enormous development of the telegraph and the use of copper for cartridges, and for electrical appliances. In 1896 the copper produced in this country amounted to 458.722,-560 pounds, and this, added to 19,000,000 pounds of copper mixed with nickel, makes a total of 477,722,560 pounds of copper mined in the U. S. Of this amount about 271,000,000 pounds were exported, and 206,000,000 pounds were consumed in this country.

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The American product of copper in 1894 was 160,000 tons; 1895 it was 170,000 tons, and in 1896 it was in excess of 200,000 tons, or ten times more than the total American product of copper sixteen years ago, and nearly 40 per cent. more than the total copper product of the world sixteen years ago. The enormous increase in the demand for copper is, in part, due to the increased need of it for electrical appliances, for copper is used for telephones, electric cars, trolley wires, and cables. The development of trolley lines in other countries and of the tele-

phone service has greatly increased the home demand for American copper. There has been a large increase in the exports of copper utensils, too. While in 1895 10,000 tons of American copper were sent to England, the total amount for 1896 was 16,000 tons, an increase of more than 50 per cent.

The most productive copper districts of the U. S. are the north peninsula of Michigan, Montana, and Arizona. These three districts produce about nine tenths of all the copper mined in this country, but Colorado yields considerable, California some, and Utah is beginning to be a factor. The price of copper in the English market was just twice as much at the beginning of the Civil War as it is now, and Great Britain then produced 13,000 tons to 5,500 in the U. S. Now the English product is only 1,500 tons.

**Cop' peras**, sulphate of iron or green vitriol, a salt of a peculiar astringent taste and of a fine green color. When exposed to the air it assumes a brownish hue. It is much used in dyeing black and in making ink, and in medicine as a tonic. The copperas of commerce is usually made by the decomposition of iron pyrites.

**Copper Glance**, a copper ore of a lead or irongray color. It consists of 81 copper and 19 sulphur, and abounds in Cornwall and many European countries.

**Cop** permine River, a river, British North America, which falls, after a course of about 250 mi., into the Arctic Ocean.

250 mi., into the Arctic Ocean. **Copper-nickel** (or Kupfernickel), an ore of nickel, an alloy of nickel and arsenic, containing about 60 of the former and 40 of the latter, of a copper color, found in the mines of Westphalia.

**Copper-plate**, a polished plate of copper on which the lines of some drawing or design are engraved or etched to be printed from; also a print or impression from such a plate. **Copper Pyri'tes** (or yellow copper ore), a

**Copper Pyri'tes** (or yellow copper ore), a double sulphide of copper and iron composed in equal parts of copper, sulphur, and iron. It occurs mostly in primary and metamorphic rocks, and is the chief copper ore of England.

**Cop' rolites,** the term originally applied to the fossil excrements of extinct animals, chiefly lizards or sauroid fishes. They resemble oblong pebbles, and are found mostly in the Lias and Coal Measures. They consist chiefly of phosphates of calcium and magnesium, and the carbonates of the same metals, and organic matter, and as the fertilizing properties of these are well known, coprolites have been largely used as a manure. For this purpose they are reduced to powder and used as ground bones, or treated with sulphuric acid, so as to form superphosphate of lime.

**Cop' tis**, a small genus of plants, nat. order Ranunculaceæ, two species of which are found in Canada and the northern parts of the U.S.

**Cop' yright**, denotes the property which an author has in his literary works, or which any other person has acquired by purchase, and which consists of the exclusive right of publication; or the right which a designer, engraver,

## Coquimbo

painter, draughtsman, photographer, or sculptor has in his designs, engravings, paintings. etc. The copyright law of the U.S. gives the copyright of a work exclusively to the author for twenty-eight years with renewal to himself, his widow, or children for fourteen years more. In the case of encylopædias, reviews, magazines, and other periodical works, the copyright is vested in the proprietors as if they were the authors; but after twenty-eight years the copyright of all articles claimed by the authors reverts to them for the period of fourteen years still to elapse under the terms of this act. It is, of course, quite competent to the authors of such articles to reserve the right of publishing them in a separate form. Dramatic and musical compositions are subject to the same copyright as books. The exclusive right of performing dramatic and musical compositions not printed, or of causing them to be performed, belongs to the author or his assignees under the same rules of copyright as those relating to books. Lectures and public speeches are the property of the author and cannot be published without his consent, unless they are lectures delivered on any public endowment or foundation. Letters are the property of the writer, and the receiver has no right to publish them without the writer's consent. Anv person pirating a copyright work is liable to a special action, and all copies of pirated works become the property of the proprietor of the copyright. In European countries copyright is generally for the author's life, and a varying period thereafter-twenty, thirty, or even fifty As to Canadian copyright, an author vears. domiciled in Canada, or in any part of the British possessions, or being citizen of a state having an international copyright treaty with Great Britain, may secure copyright in Canada for twenty-eight years and renewal of it for fourteen years to himself or to his widow and children, but to no one else who may be in possession of the copyright.

A copyright may exist in a translation or in part of a work (as in notes or additional matter), with an exclusive right to the whole; but a *bona fide* abridgement of a book is not considered in America and England a violation of the original copyright. So a person may use fair quotation if by its application he makes it a part of his own work, but cannot take the whole or a large part of a work under the pretense of quotation.

International copyright is when nations make mutual arrangements as to copyright. In March, 1891, Congress passed an International Copyright act. By its terms the entire manufacturing of foreign copyrighted work must be performed in the U.S.

**Coquelin**, BENOIT-CONSTANT, French actor, b. in Boulogne, Jan. 23, 1841. Since 1884 he has been an associate of the *Theater Français*. M. Coquelin stands at the head of the dramatic profession in France, and has played with great success in England and the U.S.

**Coquimbo** (ko-kim'bō) (or La Serena), a town of Chile, capital of the province of Coquimbo. Pop. 13,000. Ровто Соquimbo. the

# Coquito

port of the above, from which it is distant 7 mi. to the s.w., has smelting works and a large export trade, chiefly in copper and the precious metals. Pop. 5,100. The province is rich in copper, silver, gold, and other metals, and is mountainous Pop. 165,474.

**Coquito** ( $k\bar{o}$ - $k\bar{e}$ -'t $\bar{o}$ ), a very beautiful palm of Chile, allied to the cocoanut, growing to the height of 40 or 50 ft., yielding a rich, sweet sap, which when boiled is called palm honey.

**Coral** is the name applied to the Zoophytes, having the property of secreting lime from the ocean and incorporating it among the tissues of their own bodies, as well as to their calcareous remains. There are two kinds of corals, the reef-building corals where the calcareous substance is deposited in the walls of the body, and the red coral of commerce in which the deposit is external. In composition coral consists chiefly of carbonate of calcium with vari-



A.-Branch of Dendrophyllia; B.-Part of a stock of red coral, with (a) fully extended polyp. and (b, b) two polyps, partly extended.

able quantities of salts. Coral reefs are composed of the calcareous remains of polyps, and are divided into fringed, barrier, and lagoon. The fringed reefs are often converted into barrier reefs. The coral of commerce and the arts is the production of various polyps and is of different colors and internal structure. The red, pink, and black are most highly prized. The red coral has a branching, shrublike form and is found in the Mediterranean. Coral fishing is carried on in various parts of the Mediterranean. The raw coral is wrought chiefly in Leghorn, Genoa, and Naples, whence it is sent to the East Indies, Germany, Russia, etc. The value of the coral brought yearly to Genoa amounts to nearly \$2,500,000. Coral is capable of taking a good polish.

**Coral Fishes**, a name given to several fishes of different genera. They are found in all tropical seas, especially about coral reefs, and are all brilliantly colored. The most important is the "emperor of Japan" which meas-

# Corday D'Armans

ures about 15 in. in length, and is the most esteemed of all the Indo-Pacific fishes.

**Coral Rag,** in geology, the highest member of the middle Oolitic series—a variety of limestone containing an abundance of petrified corals, occurring in some parts of England. **Coral Sea**, part of the Pacific on the north-

**Coral Sea**, part of the Pacific on the northeast of Australia between it and the Solomon Islands and the New Hebrides.

**Coral Tree**, the name of leguminous trees and shrubs, natives of Africa and America. with trifoliolate leaves and beautiful scarlet spikes of papilionaceous flowers. **Cor'bel**, in archi-

**Cor'bel**, in architecture, a piece of stone, wood, or iron projecting from the vertical face of a wall, to support some super incum bent mass. Corbels are of a great variety of forms, and are ornamented in many ways.

**Corbie Steps**, in architecture, steps into which the sides

of gables from the eaves to the apex are broken. They are common in old Scotch architecture, into which they were probably introduced from France.



Corbie Steps.

**Corcoran**, WM. WILSON (1798-1889), American banker and philanthropist. In 1828 he had charge of the real estate held by the U. S. Bank and the Bank of Columbia in the District of Columbia, and continued their agent until 1836. In 1835 he was married to Miss Louise A. Morris. It was in 1837 that he began his career as banker and broker in Washington. In 1854 he retired from the banking business and after gave much of his time to objects of benevolence.

**Corday D'Armans** (kor-dū-dür-män), MARIE ANNE CHARLOTTE (1768-1793), commonly called Charlotte Corday, was born in Normandy. Her lover, an officer in the garrison of Caeu. was accused by Marat as a conspirator against



the republic, and assassinated by villains hired for that purpose. This, as well as a deeprooted hatred against all oppressors, determined Charlotte Corday to free her country from Marat. Having obtained an interview with Marat at his own house, she plunged her dagger into his bosom, and gave herself up to the attendants who rushed in at his cries. When tried for the murder before the revolutionary tribunals, she was condemned to the guillotine and executed.

Cor'dova, an ancient Spanish city on the Guadalquivir, in Andalusia, capital of a province of same name. The cathedral is a splendid building, originally a mosque, erected in the eighth century by King Abderahman. The town is well supplied with schools, hospitals, and other institutions. It has always carried on considerable trade; and under the Moors the leather exclusively manufactured there (cordovan) was exported in all directions. Cordova, which was founded by the Romans, became the capital of Arabian Spain and the center of Arabian splendor and science under the caliphs of the West. At this time it is said to have had a rop. of 1,000,000. With the decay of the Moorish Empire it fell into the hands of Ferdinand III of Castile. Pop. 55,-614. The province includes the fertile and beautiful valley of the Guadalquivir and the mountains of Sierra Morena. Area 5,188 sq. mi.; pop. 420,728.

Cor'dova, a town of the Argentine Republic, capital of province of same name. It occupies a beautiful and well-sheltered site in the valley of the Primero, and has railways to Rosario and Tucuman. Pop. 67,200. The province has an area of 54,000 sq. mi., and a pop. of 377,200.

Cor'dovan, a fine leather which took its name from the city of Cordova, where it was manufactured in large quantities. Much is now made in Northern Africa and the Levant.

Corduroy', a thick cotton stuff corded or ribbed on the surface. Corduroy road, in the U. S., a road constructed with logs laid together over swamps or marshy places for carriages to pass over.

Corea. See Korea. Corelli, ARCANGELO (1653-1713), Italian musician. By his sonatas for the violin, and by his concerti, he may be considered the creator of a new species of harmony, especially for his own instrument, the violin.

Corentyn (kor'en-tin), a river of South America separating British and Dutch Guiana. It has a course of 300 mi., and is navigable 150 mi.

Cor'fu, a Greek island in the Mediterranean, the most northerly of the Ionian Islands. Area 427 sq. mi.; pop. 118,730. The surface rises at one point to the height of 3,000 ft.; the scenery is beautiful, the climate pleasant and healthy, the soil fertile. Oranges, citrons, grapes, honey, wax, oil, and salt are abundant. A Corinthian colony settled in the island in the eighth century B.C. The Venetians pos-sessed Corfu from 1386 to 1797, the British from 1815 to 1864. CORFU, the capital, is finely situated on a promontory, which terminates in a huge insulated rock, crowned by the citadel; the streets are Italian in style; chief edifices. the cathedral, government palace, and Ionian academy. There is a good harbor and con-siderable trade. Pop. 21,670.

Corian' der, an umbelliferous plant, native of Italy, and cultivated in other parts of Europe. The whole plant has an unpleasant smell, but the fruit, improperly called seed, is very agreeable and aromatic when dry. It is used as a carminative and aromatic in medicine, and as an ingredient in cookery and confectionery.

Corin' na, an ancient Greek poetess of Tanagra, in Bœotia, contemporary with Pindar (about 500 B. C.), whom she is said to have conquered five times at musical contests. Only a few fragments of her songs have come down to us.

Cor' inth, a once celebrated city upon the isthmus of the same name, which unites Peloponnesus with Northern Greece. It was renowned among the cities of Greece, commanded by its advantageous position a most important transit trade, and possessed all the splendor which wealth and luxury could create; while its citadel, the Acrocorinthus, nearly 2,000 ft. high, rendered it a strong for-tress. Only a few ruins remain to attest its ancient magnificence. It had two harbors, Lechæum on the west side of the isthmus, on what is now the Gulf of Corinth, or Lepanto, and Cenchreze, on the Gulf of Athens or Ægina. Near Corinth were held the Isthmian games. Besides being one of the most magnificent, it was also one of the most voluptuous cities of Greece. After many political vicissitudes Corinth became the head of the Achæan League, and was conquered and destroyed by the Roman consul Mummius, 146 B. C. Julius Cæsar, about a hundred years later, rebuilt it; but its commerce could not be restored, though it became a place of note and importance. St. Paul lived here a year and a half, and two of his epistles are addressed to the Corinthians, New Corinth is a village on the shore of the gulf, several miles n.w. from the site of ancient Corinth; it is the seat of an archbishop. Pop. 4,150.

Corinth, GULF of (or Gulf of Lepanto), a beautiful inlet of the Mediterranean, about 80 mi. long, between the Peloponnesus and Northern Greece, having the Isthmus of Corinth closing it in on the east.

Corinth, Isthmus or, the isthmus which connects the Morea (Peloponnesus) with Northern Greece, varying in width from 4 to 8 mi. A canal, begun in 1882 and about 4 mi. long, across the isthmus, enables vessels to sail from the Archipelago to the Adriatic without rounding Cape Matapan. Corinthian Order, that order of Grecian arch-

itecture of which the most characteristic features is the capital of the column, which is adorned with beautifully carved acanthus leaves, but varies considerably in minor details. The column is generally fluted, with a fillet between the flutings, and stands upon a base. The

entablature is variously decorated, especially the cornice; the frieze may be quite plain, or sculptured with foliage and animals. The Corinthian order was not very common in Greece before the time of Alexander the Great; among the Romans it was much employed.

**Coriola**'nus, the name given to an ancient Roman, Caius, or more properly, Cneius, Marcius. He was banished for seeking to deprive the plebeians of their hard-earned privileges, and in particular of the tribuneship; and seeking revenge, he took refuge among the Volsci, the bitterest enemies of Rome, and prevailed upon them to go to war with her. The Volscian army, after making itself master of the cities of Latium, was pitched in sight of Rome before troops could be raised for the defense. The Roman senate made unavailing overtures for peace, till at length the tears of Veturia his mother, and Volumnia his wife, when they appeared at the head of the Roman matrons, induced Coriolanus to withdraw his army from before Rome.

Cork, a city in the south of Ireland, capital of the county of Cork, situated on the river Lee. It is 15 mi. from the sea, and besides an upper harbor at the city itself, and quays extending over four miles in length, there is a lower harbor at Queenstown, 11 mi. below the The entrance, deep and narrow, is town. strongly fortified on each side. Cork is the third city in Ireland, and exports great quantities of grain, butter, bacon, hams, eggs, and live stock. The principal industries are tanning, distilling, brewing, and making of tweeds and friezes. There are also iron foundries and yards for the building of iron ships. The principal buildings are the Protestant and Roman Catholic cathedrals, exchange, customhouse, chamber of commerce, courthouse, Queen's college, etc. There is a naval dockyard at Haulbowline, an island within Cork harbor. Cork sends two members to Parliament. Pop. 75,345. The county is the most southerly and largest in Ireland, having an area of 2,885 sq. mi. The west part is mountainous, the north and east very fertile. The coast is indented with numerous bays and inlets, of which the more important are Bantry Bay, Kinsale and Cork harbors. The climate is remarkably mild, though moist. The county is watered by the Bandon, Lee, and Blackwater. Cattle, sheep, pigs, and quantities of butter are exported. The fisheries are important. The county has seven political divisions, each send-ing a member to Parliament. The county town is Cork; other towns are Queenstown, Fermoy, Youghal, Bandon, Mallow, and Kinsale. Pop. 438,432

**Cork** is the external bark of a species of oak which grows in Spain, Portugal, and other southern parts of Europe and in the north of Africa, and is distinguished by the great thickness and sponginess of its bark, and by the leaves being evergreen, oblong, somewhat oval, downy underneath, and waved. The outer bark falls off of itself if left alone, but for commercial purposes it is stripped off when judged sufficiently matured, this being when the tree has reached the age of from fifteen to thirty vears. The first stripping yields the coarsest kind of bark. In the course of eight or nine years, or even less, the same tree will yield another supply of cork of better quality, and the removal of this outer bark is said to be beneficial, the trees thus stripped reaching the age of 150 years or more. The bark is removed by a kind of ax, parallel cuts being carried round the tree transversely and united by others in a longitudinal direction, so as to produce oblong sheets of bark. These vary in thickness between three-fourths of an inch and three inches. Care must be taken not to cut into the inner bark, or the tree would be killed. The pieces of cork are flattened out by heat or by weights, and are slightly charred on the surface to close the pores. Cork is light, elastic. impervious to water, and by pressure can be greatly reduced in bulk, returning again to its original size. These qualities render it peculiarly serviceable for the stopping of vessels of different kinds, for floats, buoys, swimming belts or jackets, artificial limbs, etc.

The cork is sorted into four grades after which it is put into sheet-iron boxes and steamed. The cork is steamed so it will not take the temper out of the circular knives or punches which slice up the cork and make it into stoppers. The hollow punch which cuts into the cork twists around about 800 times a minute as it goes through the sheet, and the disk-shaped knife revolves 600 times a minute. The circular knife which slices the cork into strips, which are just as wide as the corks to be punched from it, is a disk of fine-tem-pered, thin steel about 28 in. in diameter. The revolving knife cuts the cork across the grain. the strips varying from 8 to 18 in. in length. and as wide as the cork is long. The punches or cutters are hollow cylinders made of the finest grade of tool steel and vary from an eighth of an inch to two and a half inches in diameter. The punch works horizontally and is held in place by a chuck on the end of the shaft. The shaft is drawn forward against the strip of cork which is held against a stop. A straight cork is made every time the shaft is drawn forward. As the punch returns to its original position the cork is forced out of it by a plunger and it rolls into a basket beneath. About 18,000 corks can be punched in a single day by one of these machines. The leavings from the strips of cork are granulated for insulating material and packing for ice-houses and refrigerators. The straight corks are taken to a tapering machine which is a large circular knife revolving in a horizontal position. The corks are fed into a device which carries them up against the knife. The cork is held in a slanting position and the knife cuts off shavings so as to give a bevel or taper to the cork. The corks are then selected into different grades and placed in packages for shipment.

Cork, FOSSIL, a kind of mineral, a species of asbestos.

Corliss, GEORGE HENRY (1817-1888), American inventor. The construction of stationary

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# Cormorant

steam engines was revolutionized by his improvements. He invented many ingenious devices.

**Cor' morant**, the name of several large webfooted birds of the pelican family, or forming a family by themselves. They have a longish and strongly hooked bill, long neck, short wings, and rather long. rounded tail; all the toes are united by a web, and, though excellent swimmers, they are able to perch on trees: color generally black or dark. The common cormorant of Europe is larger than a goose, but with smaller wings. It occupies cliffs by the sea, feeds on fish, and is extremely voracious. It dives and swims with great power, and pursues its prey beneath the sur-



#### Cormorant.

face of the water, often to a great depth. Among the Chinese cormorants have long been trained to fish for man. At first a ring is placed on the lower part of the bird's neck to prevent it swallowing the prey, and in time it learns to deliver the fish to its master without such a precaution being necessary. Another British cormorant is the green cormorant or shag. It is smaller than the common cormorant. Both these species are found also on the eastern coasts of America, and there are various other American as well as Australian species.

**Corn** is the generic term for all kinds of grain used for making bread, and is applied specifically to the principal breadstuff; in England to wheat, in the U. S. generally to maize, and frequently in Scotland to oats.

**Corn**, INDLAN (or Maize), is the produce of Zeamays, a species of cereal. The stem, which is filled with a pithy, fibrous structure, is divided at irregular intervals by nodes, and its strength and solidity is increased by a siliceous outside covering. From the lowest, and sometimes also the second and third node, it sends out "brace" roots, and these help to support the plant, which sometimes grows to 10 ft. In height, the minimum being generally 3 ft. The ears — which are developed within the leaf-sheaf at the uodes, and consist of a "cob" with the grains disposed upon it in regular rows of from eight to twenty, and long "silk" threads attached to each embryo, which usually extend beyond the closely folded

tip of the mass of imbricated leaves ("husk") that wraps the whole - are from half an inch to 3 in. in diameter, and from 2 to 17 in. in length. The stem is topped by a "tassel," producing an abundance of light, dry, looselyattached pollen. It is held to be superior in nutriment to barley, buckwheat, and rye. By analysis it gives 77 per cent. of starch; 3 of zein, a principle analogous to gluten; 2.5 of albumen; 1.45 of sugar; .8 of extractive; 1.75 of gum; 1.5 of sulphate and phosphate of lime; 3 of lignin; and 9 of water. It is more generally used in America (North and South) than in the other continents -- in the U.S. the crop is over 2,000,000 bu., or about two thirds of all the grains grown; but in the Mediterranean countries, Germany, etc., it is also highly valued. The green ears of the sweet varieties are boiled and eaten from the kernel or served in milk. When coarsely ground corn forms the hominy, and finer ground it furnishes the mush or porridge. Pop-corn is a variety whose grains can be roasted and turned and shaken smartly over a brisk fire till they swell and burst, turning inside out; in this state they are coated with syrup and pressed into a ball, or the separate grains are simply sprinkled with salt. The deficiency of gluten in the meal of maize renders it ill adapted to bread-making: but johnny-cakes made from it are popular. Large quantities of starch are manufactured from corn, both for laundry purposes and for making puddings, custards, and blanc-mange; and the starch, by treatment with acid, is converted into glucose or The canning of green sweet grape sugar. corn is also an important industry in some states. By the Mexicans the small young shoots of thickly-sown crops are served at table like asparagus and as dessert. The stems of sugar corn when full grown yield by pressure a thin sweet juice, which unfermented gives a pleasant syrup and from 5 to 15 per cent. of sugar, fermented a beer called chica, and distilled an excellent spirit resembling brandy. In countries where corn does not ripen well it is sometimes sown to afford food for poultry, or to be mown as green fodder for cattle. Where it is cultivated for its grain the dried leaves are used as winter fodder. The stalks are used for thatch and for fuel, and for making baskets. The fibers of the culm and leaves afford a durable kind of yarn; and the husks are elastic, and can be applied to the stuffing of chairs, saddles, etc., and to the manufacture of good durable mattresses, which have become a profitable article of trade in Paris and Strasburg. The husks are also much used for packing oranges and lemons, and in South America for making cigarettes: and good paper has been manufactured from them. Hollowed corn-cobs make homely but serviceable pipe-heads for smoking tobacco. There are few plants of which the uses are more various than corn, and few which are of greater importance to man. Another species of maize, called Chile Maize or Valparaiso Corn, is distinguished by its serrated leaves. It is a smaller plant, a native of Chile, and has

## Cornaceæ

won a superstitious regard because its grains when roasted split in the form of a cross. The native country of corn is uncertain. In an ancient Chinese encyclopædia in the royal library at Paris is an excellent representation of the plant; so that while it was undoubtedly first introduced to Europe about the year 1520 by Columbus from America, there are good grounds for the conclusion that it was known and cultivated in the ancient world long before that time.

**Corna** ceæ, a natural order of polypetalous exogens, consisting of about 100 species, two of which are found in Britain, a lowly Alpine plant and the common dogwood or prickwood. Several plants of this order are of service as tonics and for the cure of ague.

**Corn Crake** (or Landrail), a species of bird of the order Grallæ or Waders, and of the family Rallidæ or rails. The crakes differ from the rails proper in having the bill shorter.



Corn Crake.

The name is expressive of its cry. It feeds on worms and insects. It is a bird of passage, frequenting the northern parts of Europe during summer, and the southern, including the Mediterranean coasts of Africa, in winter.

**Cor' nea**, one of the coats of the eye, a transparent membrane in the fore part of it.

**Corneilie** (kor-nā-yó), PIERRE (1606-1684), the father of French tragedy and classic comedy, was born at Rouen. In 1635 he entered the field of tragedy with Medea; but it was not till the appearance of his next work, the famous *Cid*, that Corneille's claim was recognized to a place among the great tragic poets. After the *Cid* appeared in rapid succession *Horace*, *Cianae*, his masterpiece according to Voltaire, and *Polycucte*, works which show Corneille's genius at its best.

**Cornel** (or Cornelian Tree), a species of dogwood, a tree or shrub of the order Cornaceæ, distinguished by the hardness of its wood, a native of Asia and the south of Europe. One of the finest, the round-leaved Cornel, is a large shrub, 5 to 10 ft. high, common from Virginia to Canada.

**Corne' lian** (or Carnelian), a gem of a lightred or flesh color. It consists of silica along with minute quantities of the oxides of iron, aluminum, and sometimes of other metals, and is used for seals, bracelets, necklaces, and other articles.

**Corne' lius,** PETER VON (1787-1867), German painter. In 1811 he went to Rome, where, in conjunction with Overbeck, Veit, and other associates, he may be said to have founded a new school of German art, and revived fresco painting in imitation of Michael Angelo and Raphael.

**Corne lius Nepos**, a Roman author of the first century B. C., the contemporary of Cicero and Catullus. The only extant work attributed to him is a collection of short biographies, probably an abridgment of a work written by Nepos. These biographies have long been a favorite school book, and popular editions of them are very numerous.

**Cornell**, ALONZO B., son of Ezra Cornell, was b. in Ithaca, N. Y., 1832. In 1879 he was elected governor of New York and served till Dec. 31, 1882.

**Cornell,** EZRA (1807-1874), American inventor and philanthropist, b. iu New York state. He realized a large fortune through his connection with the electric telegraph system, and devoted a greater part of it to the endowment of Cornell University, at Ithaca, N.Y.

**Cornell University**, at Ithaca in the state of New York, was established in 1867 with funds furnished from the income of 990,000 acres of public land allotted by Congress to the state for this purpose and with a foundation of \$500,000 presented by the Hon. Ezra Cornell, much augmented by subsequent donations. There are five general courses, including classics, literature and philosophy, science, engineering, architecture, agriculture, etc., all of which lead to a bachelor's degree.

**Cornet**, a wind instrument of former times, originally curvilinear or serpentine in form and increasing in diameter from the mouthpiece to the lower end. The modern cornopean is a kind of keyed bugle which has a very agreeable tone, and is much used in orchestras and military bands. Several forms of it are in use.

**Corning,** Steuben co., N. Y., on Chemung River. Railroads: Erie; Lackawanna; and Fall Brook. Industries: glass works, flouring mills, three iron foundries, lumber mills, novelty works, factories for the manufacture of agricultural implements, cabinets, etc. Surrounding country agricultural. Corning became a city in 1890. Pop. est. 1897, 12,000.

**Corn Laws**, a name commonly given to certain statutes passed to protect the agricultural interest in Britain. The first form of interference by legislative enactment with the corn trade in England, beginning soon after the Conquest, was the prohibition of exportation. an expedient in those times to prevent scarcity in a sudden emergency. The exportation of grain was prohibited in the reign of Edward III in 1360-61, Calais and other appointed ports being excepted. This provision was relaxed by a statute of Richard II in 1394, by which exportation was permitted from all ports not excepted by royal proclamation. In 1436, under

Henry VI, the exportation of grain was permitted without license whenever the price of wheat did not exceed 6s. 8d. per quarter, and barley 3s. 4d. At the restoration of Charles II duties were imposed both on exportation and importation, while the old principle of a standard price, beyond which exportation was prohibited, was retained. In 1804 if the price of corn was below 63s. a prohibitory duty of 24s. 3d. was laid on what was imported; if between 63s. and 66s., a duty of 2s. 6d.; and only when the price at home had risen as high as 66s. per quarter was the foreign grain allowed to pass at a nominal duty of 6d. With variations of more or less importance this sliding scale of prohibitory duties continued in force till 1846, when Sir Robert Peel, influenced by the corn-law repeal agitation, and more especially by the Anti-Corn-Law League, headed by Cobden and Bright, carried a measure repealing the duty on imported corn, except a nominal sum of 1s. per quarter, which also in 1869 was done away with, thus leaving the importation of corn entirely free.

**Corn Marigold** (*Chrysanthèmum segètum*), a common weed in British corn fields, of a rich orange color.

**Corn Moth**, a small moth, the larva of which is exceedingly destructive to corn sheaves in the field, and to stored grain, from eating into the grains. Salt, frequent turning, and many expedients are employed to destroy the eggs.

**Cornplanter**, a Seneca Indian chief, said to have been over a hundred years old at his death, in 1836. He was a bitter enemy of the whites; joined the French at the time of General Braddock's expedition, and took part in the Wyoming massacres.

**Cornucopiæ** ("horn of plenty"), a wreathed horn filled to overflowing with fruit, flowers, and grain; used as the symbol of plenty.

Corn wall, a maritime county of England, forming the southwestern extremity of the island. Area 1.350 sq. mi.; pop. 318,583. The chief wealth of the county is in its minerals, especially its mines of copper and tin, though the value of both has diminished. mines exceed 350 fathoms in depth. Several Besides tin and copper, silver, lead, zinc, iron, manganese, antimony, cobalt, and bismuth are found in comparatively small quantities. There are also valuable deposits of kaolin or china-clay. There are no manufactures, but the fisheries, particularly of pilchard and mackerel, are valuable. Cornwall, with the Scilly Isles, seems to have been the Cassiterides or Tin Islands of antiquity. The natives long maintained their independence against the Saxons, and their country was spoken of as West Wales. Their language also long continued to be Celtic. The chief towns are Bodmin (county town), Penzance, Truro, and Falmouth (with Penryn).

**Cornwall**, a port and manufacturing town of Canada, prov. Ontario, on the north side of the St. Lawrence, 67 mi. above Montreal. Pop. 6,805.

Corn' wallis, CHARLES, MARQUIS OF (1738-1806), British soldier, son of the first Earl

#### Corporation

Cornwallis. On the outbreak of the American war he sailed with his regiment, served with distinction under Howe and Clinton, and in 1780 was left in independent command in South Carolina with 1,000 men. He defeated General Gates at Camden, 1780, and fought General Greene at Guilford in 1781, but six months afterward was besieged in Yorktown and compelled to surrender Oct. 17, 1781. In 1786 Lord Cornwallis went out to India as commander in chief and governor general, invaded Mysore in 1791, and obliged Tippoo Sahib to surrender much territory. Having returned to Britain he was created a marquis (1794), appointed lord lieutenant of Ireland, and again in 1805 governor general of India.

**Corn Weevil**, a destructive insect which preys upon stored corn. It bores a hole and deposits its egg inside of the grain, which is afterward eaten to a husk by a grub.

**Coro**, a seaport town, Venezuela, at one time a flourishing place but now much decayed. Pop. 8,000.

**Corol' la**, in botany, the portion of the flower inside the calyx; the inner floral envelope. The corolla surrounds the parts of fructification and is composed of leaves called petals.

**Cor'ollary**, in mathematics, a collateral conclusion, following from a proposition demonstrated.

**Coroman'del Coast**, the east coast of the Indian Peninsula, Madras Presidency, or that portion of it between Palk's Strait and the river Pennar.

**Coromandel Wood**, the wood of a tree found in Ceylon. Its ground color is chocolate brown, with black stripes and marks; it is hard, turns well, and makes very handsome furniture.

**Coro' na** ("a crown"). 1, In astronomy, a halo, or luminous circle round one of the heav-



enly bodies; specifically the portion of the aureola observed during total eclipses of the sun, which lies outside the chromosphere or region

of colored prominences. 2, In botany, an appendage of the corolla in some flowers, coming as it were between the corolla and the stamens, well seen in the cup of the daffodil. 3, In architecture, the lower member of the projecting part of a cornice.

**Corot** (kö-rö). JEAN-BAPTISTE-CAMILLE (1796-1875). French artist, b. at Paris. He frequently painted figure subjects, including the large sacred pictures, the *Flight into Egypt* and the *Baptism of Christ;* but his most characteristic and successful work was in landscape. His woodland scenes, painted for the most part at dawn or twilight in a scheme of pale greens and silvery grays, show a singularly subtle feeling for this phase of nature, and are undoubtedly among the most important contributions of the century to landscape art.

**Corporation.** A corporation is an association of persons which the law treats in many respects as if it were itself a person. It has rights and duties of its own which are not the

# Corporation

rights and duties of the individual members thereof. Thus a corporation may own land, but the individual members of the corporation have no rights therein. A corporation may own money, but the corporators as individuals are under no obligation to pay the debt. If, however, an individual has not paid up his stock in full, he is liable for the amount unpaid. The rights and duties descend to the successive members of the corporation. This capacity of perpetual succession is regarded as the distinguishing feature of corporations as compared with other societies. One of the phrases most commonly met with in law books describes a corporation as a society with perpetual succession and a common seal. The latter point, however, is not conclusive of the cor-porate character. The legal attributes of a corporation have been worked out with great fullness and ingenuity in English law, but the conception has been taken full-grown from the The technical term in Roman law of Rome. law corresponding to our corporation is collegium; a more general term is universitas. collegium or corpus must have consistent of the cor-least three persons, who were said to be cor-porati—habere corpus. They could hold property and had a common chest. They in common and had a common chest. They might sue and be sued by their agent. There was a complete separation in law between the rights of the collegium as a body and those of its individual members. The collegium remained in existence although all its original members were changed. It was governed by its own by-laws, provided these were not con-trary to the common law. The power of form-ing collegia was restrained, and societies pretending to act as corporations were often suppressed. In all these points the collegia of Rome closely resemble the corporations of English law. There is a similar parallel be-tween the purposes for which the formation of such societies is authorized in English and Roman law. The Roman conception of a corporation was kept alive by ecclesiastical and municipal bodies. When English lawyers came to deal with such societies, the corporation law of Rome admitted of easy application. Accordingly, in no department of our law have we borrowed so copiously and so directly from the civil law. The corporations known to the earlier English law were mainly the municipal, the ecclesiastical, and the educational and eleemosynary. To all of these the same principles, borrowed from Roman jurisprudence, were applied. The different purposes of these institutions brought about in course of time differences in the rules of the law applicable to each. In particular, the great development of trading companies under special statutes has produced a new class of corporations, differing widely from those formerly known to the law.

Corporations are divided into two main classes, public and private. Public corporations are such as municipal corporations of states, counties, cities, villages, or incorporated official boards of officers, as a park board. Of private corporations there are four classes:

## Corporation

1. A corporation for the benefit of the members. In such a corporation there is no stock, no capital, and no pecuniary profit. Examples are social, artistic, scientific societies, religious and professional societies, clubs, etc.

2. Corporations for the pecuniary profit of individual members. The basis is a capital engaged in commercial enterprise. Shares of stock are held by stockholders. Such corporations are regulated in the U. S. by statutes, which designate the relations and privileges of the corporation. Such corporations are organized and chartered for a specific purpose, and cannot transact business other than that for which they are organized. Examples are railroads, telegraph and telephone companies, insurance and banking corporations. The profits are divided pro rata.

3. Corporations for mutual aid and relief. The first object is the element of personal membership and benefit; the division of profit is a secondary consideration. Examples: building and loan associations, co-operative societies, lodges of various kinds, etc. Such corporations are generally under state control. 4. Incorporated trusts. Such corporations

4. Incorporated trusts. Such corporations have a fund set apart for some purpose. This fund belongs to an abstract society, and is held by someone in trust, usually a board of trustees. Examples: colleges, hospitals, and charitable associations.

A corporation may be dissolved by the death of all its members, or of such number as leaves not enough to make new elections in the way the charter requires; by forfeiture of the charter through breach of its conditions: by surrender of the charter. In all such cases the lands of the corporation revert to their several donors; the creditors, however, if any, being entitled in the first place to insist on a sale and distribution of the property, whether in a sequestration or otherwise.

Corporations, as has been pointed out in the American Civil Rights Act of Congress, are liable to the ordinary laws and treaties of the country, but are not citizens in the sense of exercising a political or municipal franchise. The American law has also had occasion to emphasize the distinction between public corporations which may be affected by legislation, while the written constitution of the U. S. prohibits any interference with the rights of a private corporation. Further, the franchises of a corporation are treated as realizable assets for creditors. The amount of property which may be held by a corporation is frequently limited in the act or charter: and as regards charitable and religious purposes. a general law forbids the holding of more than \$50,000 worth.

The power of the majority to bind the society is one of the first principles of corporation law, even in cases where the corporation has a head. The binding majority is that of the number present at a corporate meeting duly summoned. Votes given for an illegal purpose or a disqualified person are considered as thrown away, and in an election votes must be given for some particular candidate—if they

# Corpuscular Theory of Light

are merely against a candidate, they are void. A corporation has power to make such regulations (by-laws) as are necessary for carrying out its purposes, and these are binding on its members and on persons within its local jurisdiction if it has any. Such by-laws must not be at variance with the law of the land, nor retrospective in their operation, nor unreasonable. They must further be in harmony with the objects of the society, and must not infringe or limit the powers and duties of its officers.

**Corpus' cular Theory of Light,** the older theory, which explained the phenomena of light by supposing that a luminous body emits excessively minute particles of matter, corpuscles as they were called, which striking the eye produce the sensation of light. Newton held the corpuscular theory, and supported it with great ingenuity. This theory has long been displaced by the undulatory theory.

**Correggio** (kor-re-j $\delta'$ ), ANTONIO ALLEGRI, (1494-1534), famous Italian painter, b. at Correggio near Modena. Correggio is unrivaled in chiarooscuro and in the grace and rounding of his figures. Among his best pictures are Night; the St. Jerome; the Marriage of St. Catharine; several Madonnas; the Penitent Magdalene; the altar pieces of St. Francis, St. George, and St. Sebastian.

**Correlation of Physical Forces**, a term introduced by Grove to denote what may more properly be called the convertibility of the various forms of energy. The energy, for instance, which a bullet in rapid motion possesses, is converted into heat when it strikes the target, the bullet being then warm to the touch. So heat may again be converted into kinetic energy, that is, the form of energy possessed by a moving body; for instance, through the intermediation of a steam engine. Heat is also directly converted into electricity, and electricity into heat. In connection with this doctrine that of the conservation of energy ought also to be studied.

**Corrèze** (kor-rez), an inland department, France, formed from part of the former province of Limousin, and deriving its name from the river Corrèze, by which it is traversed. Area 2.265 sq. mi.; pop. 328,119.

**Corrib**, Lough, a lake in Ireland, mostly in Galway county, area 68 sq. mi.

**Corrien tes,** a town, Argentine Republic, capital of the province of the same name. It is well placed to serve as an entrepôt of goods, between the upper parts of the Paraguay and the Parana, and the seaports on the La Plata. Pop. 14,200. Pop. of prov. 201,325; area 54,000 sq. mi.

sq. mi. **Corrosive Sublimate**, the bichloride of mercury, a white crystalline solid, an acrid poison of great virulence. The stomach pump and emetics are the surest preventives of its deleterious effects when accidentally swallowed; white of egg is also serviceable in counteracting its poisonous influence on the stomach. It is a powerful antiseptic.

Cor'rugated iron, sheet iron strengthened

by being bent into parallel furrows. It is largely used for roofing, and when dipped in melted zinc, to give it a thin coating, is commonly known as *galvanized iron*.

**Corry**, Erie co., Pa., 90 mi. s. of Buffalo. Railroads: Penna.; N. Y. L. E. & W.; N. Y. & P. Industries: iron mills, flouring mills, lumber, and sash and door factories. Natural gas, coal, and oil in vicinity. Surrounding country agricultural. Was first settled 75 years ago, but very thinly populated until the railroad was built. Pop. est. 1897, 7,000.

**Cor'sairs**, the Anglicized form of the term used in the south of Europe to denote those pirates who sailed from Algiers, Tunis, Tripoli, and the ports of Morocco.

Cor'sica, an island in the Mediterranean, forming the French department of the same name. Area 3,377 sq. mi.; pop. 288,596. There are fine forests containing pines, oaks, beeches, chestnuts, and cork trees, and the mountain scenery is splendid. In the plains and numerous valleys the soil is generally fertile; but agriculture is in a backward state. Mules, goats, horses, cattle, and sheep, and among wild animals the boar, the fox, and the deer. are common. There are good fisheries. The chief exports are wine, brandy, olive oil, chest-nuts, fruit, fish. The chief towns, Ajaccio and Bastia, are connected by railway. The island was first colonized by the Phœnicians, from whom it got the name of Cyrnos. The Romans afterward gave it that of Corsica. From the Romans it passed to the Goths, and from them to the Saracens, and in the fifteenth century to the Genoese. France had the rights of the Genoese ceded to her, after Paoli had virtually made Corsica independent, and entered on forcible possession of it in 1768. An insurrection in 1794, headed by General Paoli and assisted by the British, for a time restored the island to independence; but in 1796 it again fell under the dominion of France.

**Corsicana**, Navarre co., Tex., 54 mi. s. of Dallas. Railroads: Houston & Texas Central; and St. Louis Southwestern. Industries: two large oil mills, two cotton compresses. flouring mill, iron foundry, and numerous small factories. Coal, oil, and gas in vicinity. Surrounding country agricultural. The town was first settled in 1850 and became a city in 1875. Pop. est. 1897, 11,500,

**Cort**, HENRY (1740-1800), the inventor of the processes of puddling and rolling iron, b. at Lancaster.

**Cortes** (kor'tes), the legislative assembly of Spain and Portugal. See Spain.

**Cor'tez** (or Cortes), FERNANDO (or Hernan) (1485-1547), the conqueror of Mexico, was b. at Medellin, in Estremadura; d. near Seville. He went to the West Indies in 1504. He quitted Santiago de Cuba in 1518, with eleven vessels, about 700 Spaniards, eighteen horses, and ten small field pieces. He landed on the shore of the Gulf of Mexico, where he caused his vessels to be burned, in order that his soldiers might have no other resources than their own valor. After a desperate struggle, in which 100,000 natives are said to have perished, the city was taken, and soon after the whole-country was subjugated. In 1528 he returned to Spain; but two years after he was again sent out to Mexico, where he remained for ten years, discovering meanwhile the peninsula of California. He returned to Spain.

years, discovering meanwrite and provide the california. He returned to Spain. Cortland, Cortland co., N. Y., on Tioughnioga River, 37 mi. s. of Syracuse. Railroads: D. L. & W.; Lehigh Valley; and Erie & Central New York. Industries: wire mills, flouring mills, carriage, bicycle, skirt, chair, door, and window-screen factories, and several large wagon and sleigh factories. Surrounding country agricultural and mineral. The village was first settled in 1792, is the county seat of Cortland co. State normal and training school located here. Pop. est. 1897, 10,769.

**Corun' dum,** the earth alumina as found native in a crystalline state. In hardness it is next to the diamond. The amethyst, ruby, sapphire, and topaz are considered varieties of this mineral, which is found in India and China, and is most usually in the form of a sixsided prism or six-sided pyramid. It is nearly pure anhydrous alumina, and its specific gravity is nearly four times that of water. Its color is various—green, blue, or red inclining to gray, due to traces of iron, copper, etc. Emery is a variety of corundum.

**Corun'na**, a seaport of Spain in the province of the same name in Galicia. The harbor, which is well protected, is deep, spacious, and safe, and many improvements have been made. Cattle form the chief export. There is a government tobacco factory employing 3.000 women and girls. There is a lighthouse, 92 ft. high, called the Tower of Hercules, supposed to be of Roman construction. Pop. 37, 251. The province is hilly, and its inhabitants chiefly engaged in agriculture and fishing. Area 3,079 sq. mi.; pop. 613,881.

sq. mi.; pop. 613,381. **Cor' vidæ**, the crows, a family of conirostral birds, in which the bill is strong, of conical shape, more or less compressed, and the gape straight. The nostrils are covered with stiff bristle-like feathers directed forward. The family includes the common crow, rook, raven, magpie, jay, jackdaw, nut-cracker, Cornish chough, etc.

**Corwin**, THOMAS (1794-1865), American statesman, b. in Bourbon co., Ky. In 1844 he was elected to the U. S. Senate. He was appointed by President Fillmore secretary of the treasury in 1850, and after his service here returned to the practise of law iu Lebanon, O. In 1858 he was elected to Congress as a Republican, and was re-elected in 1860. President Lincoln appointed him minister to Mexico in 1861, but on the arrival of Maximilian he returned to Washington, and practised law.

**Cor'ymb**, in botany, that form of inflorescence in which the flowers, each on its own pedicel of different lengths, are so arranged along a common axis as to form a flat, broad mass of flowers with a convex or level top, as in the hawthorn and candytuft.

Cor' ypha, a genus of palms, including the fan palm, gebang palm, and taliput.

Coryphæ'na (Cor'yphene), a genus of fishes

of the mackerel family. The body is elongated, compressed, covered with small scales, and the dorsal fin extends the whole length of the back, or nearly so.

**Cos** (now called Stanchio or Stanko), an island in the Ægæan Sea, on the coast of Asia Minor. Area 95 sq. mi.; pop. 11,000.

Minor. Area 95 sq. mi; pop. 11,000. **Cosenza** (ko-sen'tså), a city of Southern Italy, capital of province of Cosenza or Calabria Citeriore, 150 mi. s.e. Naples; pop. 15,149. It has manufactures of silk, pottery, and cutlery; the environs are beautiful, and produce abundance of corn, fruit, oil, wine, and silk. **Cosmog'ony** (Greek, kosmos, world; and

gone, generation), a theory of the origin or formation of the universe. Such theories may be comprehended under three classes: 1, The first represents the world as eternal, in form as well as substance. 2, The matter of the world is eternal, but not its form. 3. The matter and form of the universe is ascribed to the direct agency of a spiritual cause; the world had a beginning, and shall have an end. Aristotle appears to have embraced the first theory; but the theory which considers the matter of the universe eternal, but not its form, was the prevailing one among the ancients, who starting from the principle that nothing could be made out of nothing, could not admit the creation of matter, yet did not believe that the world had been always in its present state. The prior state of the world, subject to a constant succession of uncertain movements which chance afterward made regular, they called chaos. The Phœnicians, Babylonians, and also Egyptians, seem to have adhered to this theory. One form of this theory is the atomic theory, as taught by Leucippus, Epicurus, and Lucretius. According to it atoms or indivisible particles existed from eternity, moving at hazard, and producing, by their constant meeting, a variety of substances. After having given rise to an immense variety of combinations they produced the present organization of bodies. The third theory of cosmogony makes God, or some deity, the creator of the world out of nothing. This is an ancient and widely spread theory, and is that taught in the book of Genesis. Anaxagoras was the first among the Greeks who taught that God created the universe from nothing. The Romans generally adopted this theory, notwithstanding the efforts of Lucretius to establish the doctrine of Epicurus.

**Cosmos,** order or harmony, and hence the universe as an orderly and beautiful system. In this sense it has been adopted by Humboldt as the title of his celebrated work, which describes the nature of the heavens as well as the physical phenomena of the earth.

**Cos' sacks**, tribes who inhabit the southern and eastern parts of Russia, paying no taxes, but performing instead the duty of soldiers. Writers are not agreed as to the origin of this people and of their name, but they are believed to be a mixed Caucasian and Tartar race. In personal appearance the Cossacks bear a close resemblance to the Russians. Originally their government formed a kind of democracy, at the head of which was a chief or hetman of their own choice; while under him was a long series of officers with jurisdictions of greater or less extent, partly civil and partly military, all so arranged as to be able on any emergency to furnish the largest military array on the shortest notice. The democratical part of the constitution has gradually disappeared under Russian domination. The title of chief hetman is now vested in the heir apparent to the throne, and all the subordinate hetmans and other officers are appointed by the crown. Care, however, has been taken not to interfere with any arrangements which foster the military spirit of the Each Cossack is liable to military Cossacks. service from the age of eighteen to fifty, and is obliged to furnish his own horse. They furnish the empire with one of the most valuable elements in its national army, forming a firstrate irregular cavalry, and rendering excellent service as scouts and skirmishers. In 1570 they built their principal "stanitza" and rendezvous, called Tcherkask, on the Don, not far above its mouth. As it was rendered un-healthy by the overflowing of the island on which it stood, New Tcherkask was founded in 1805 some miles from the old city, to which nearly all the inhabitants removed. This forms the capital of the country of the Don Cossacks, which constitutes a government of Russia, and has an area of 61,900 sq. mi. and a pop. of 1,474,133. It has a military organization of its own.

Costa Rica, the most southern state of the republics of Central America; area 23,000 sq. mi., including some disputed territories on the northern frontier. The country is intersected diagonally by the primary range or cordillera of the isthmus, which throws off numerous spurs on either side. The principal range contains several lofty eminences and volcanoes. Costa Rica is said to contain some rich gold mines; at present, however, they are not worked to any great extent. Silver and copper are also found. The country is extremely fertile. Coffee, rice, maize, etc., are raised on the table-land in the interior: and cacao, vanilla, sugar, cotton, tobacco, etc., are cultivated in the low coast regions. Coffee forms the most important product. The forests are valuable. The capital is San José, and the two established ports are Punta Arenas, on the Pacific side, and Porto Limon, on the Caribbean Sea. It has been an independent state since 1821, from 1824 to 1839 forming a part of the Central American Confederation, but subsequently separate. Pop. 243,205, mostly of Spanish descent.

**Coster,** LAURENS (1370-1440), whose name is connected with the origin of printing, was b. in Haarlem. According to a statement first found in Junius' Batavia (1588), he was the original inventor of movable types, and on this ground the Dutch have erected statues in his honor. But in 1870 a Dutchman, Van der Linde, professed to have demolished the claims of Haarlem to the invention of printing, and to have established that Holland, like other

countries, was indebted for it to the Mayence school. This conclusion has been rejected by J. H. Hessels, who, on carefully investigating the matter, thinks it highly probable that Coster was the inventor.

**Côte-d'Or**, an inland and eastern department of France, part of the old province of Burgundy, having Dijon as its capital. It is watered by the Seine, the Saône, and their affluents, and derives its name from the Côted'Or hills, which traverse it from n.e. to s.w. Area 3,382 sq. mi. The vineyards of the eastern slopes of the Côte-d'Or produce the celebrated wines of Upper Burgundy. Iron, coal, marble, etc., are found. Pop. 376,866.

**Côtes-du-Nord** (kot-dü-nor). a maritime department in the north of France, forming part of ancient Brittany; capital Brieuc. Area 2,659 sq. mi. The coast extends about 150 mi., and the herring, pilchard, and mackerel fishing is actively pursued. One of the main branches of industry is the rearing of cattle and horses. In manufacturing industries the principal branch is the spinning of flax and hemp, and the weaving of linen and sail cloth. Among the minerals are iron, lead, and granite. Pop. 618,652.

**Cotopax'i,** the most remarkable volcanic mountain of the Andes, in Ecuador, about 60 mi. n.e. of Chimborazo; altitude 19,500 ft. It is the most beautiful of the colossal summits of the Andes.

**Cotta**, JOHANN FRIEDRICH, BARON VON (1764– 1832), an eminent bookseller of Germany.

**Cotton,** the name given to the soft cellular hairs which encircle the seeds of plants of the



Cotton (Gossypium Barbadense). -a. -ripe capsule after dehiscence; b.-seed; c.-the same deprived of its hairs.-(From Bentley & Trimen.)

genus Gossypium, nat. ord. Malvaceæ. The genus is indigenous to both the Old and the New World, and the plants are now cultivated all over the world within the limits of  $30^{\circ}$  north and south of the equator. All the species are perennial shrubs, though in cultivation they are sometimes treated as if they were annuals.

They have alternate stalked and lobed leaves. large, yellow flowers, and a three or five celled capsule, which bursts open when ripe through the middle of the cell, liberating the numerous black seeds covered with the beautiful fila-mentous cotton. The North American cotton is produced by Gossypium barbadense, and two well marked varieties are cultivated, the longstaple cotton, which has a fine, soft, silky fiber nearly 2 in. long, and the short-staple cotton, which has a fiber little over 1 in. long adhering closely to the seed. The long-staple variety known as Sea Island cotton holds the first place in the market. It is grown in some of the southern states and on islands bordering the coast. The cotton grown in South America is obtained from G. peruviānum, called also kidney cotton. The indigenous Indian species is G. herbaceum, which yields a short-stapled cotton. It is grown throughout the Mediterranean region as well as in Asia. The mode of cultivation is usually as follows: The seeds are sown in the spring in drills of about a yard in width, the plant appearing above ground in The rows of about eight days afterward. young plants are then carefully weeded and hoed, a process which requires to be repeated at two or three subsequent periods. No hoeing takes place after the flowering has commenced, from which a period of seventy days generally elapses till the ripening of the seed. To prevent the luster of the cotton wool from being tarnished, the pods must not remain ungathered longer than eight days after coming to maturity. The cotton wool is collected by picking with the fingers the flakes from the pods. and then spreading out to dry, an operation which requires to be thoroughly per-formed. The cotton now comes to be separated from the seeds, a process formerly effected by manual labor, but which is now generally After being accomplished by machinery. cleansed from the seeds, the cotton wool is formed into bales, and is now ready for delivery to the manufacturer.

Cotton has been cultivated in India and the adjacent islands from time immemorial. It was known in Egypt in the sixth century before the Christian era, but was then probably imported from India. It was not till a comparatively late period that the nations of the West became acquainted with this useful commodity, and even then it appears only to have been used as an article of the greatest luxury. The introduction of the cotton shrub into Europe dates from the ninth century, and was first effected by the Spanish Moors, who planted it in the plains of Valencia. Cotton manufactories were shortly afterward established at Cordova, Granada, and Seville: and by the fourteenth century the cotton stuffs manufactured in the kingdom of Granada had come to be regarded as superior in quality to those of Syria. In China the cotton shrub was known at an early period, but it does not appear to have been turned to any account as an article of manufacture till the sixth century of the Christian era, nor was it extensively used for that purpose till nearly the middle of the fourteenth

century. In the New World the manufacture of cotton cloth appears to have been well un-derstood by the Mexicans and Peruvians long before the advent of Europeans. It was planted by the English colonists of Virginia in 1621, but only as an experiment, and the amount produced was long very small, the crop only amounting to about 2,000,000 lbs. in 1791. After this it rapidly increased, and in 1810 94,000,000 lbs. were exported. The quantity now produced is enormous, the crop of 1896 being estimated at 7,162,473 bales, averaging 440 lbs. each. The chief cotton-growing states are Mississippi, Georgia, Texas. Alabama. Arkansas, South Carolina, Louisiana, North Carolina, Tennessee, and Florida. The raw cotton exported in 1896 was 4,565,014 bales. In 1890 a process was discovered by which cotton can be manufactured from straw.

The cottons of commerce are usually distinguished by geographical names borrowed from the countries in which the article is produced, and under each of these divisions various qualities are recognized. The chief contributors to the European supply are the U. S., India. Egypt, and Brazil. There were in operation in the U. S. in 1894 16,811,000 spindles.

Cotton, ROUND BALING OF. As opposed to the packing of cotton in a square box and its compression in bulk, a new system of baling has been introduced which is a combination process and admits of obtaining by one operation, on the plantation where the cotton is ginned, the same result that now calls for two operations at a considerably greater expense. As is well known the present system involves the formation on the plantation of the "country" bale, which has a density of twelve lbs. to the cubic foot. After which it is transported to shipping centers and compressed to a density of 22 to 26 lbs. per cu. ft. for final shipment. In the old method, the cotton was compressed in bulk and between the fiber and in the fibers themselves, a certain amount of air was also compressed. The result being that in case of fire the increased supply of oxygen in the center of the bale tended to increase combustion so that a fire among cotton bales consisted of their smoldering inside and being impervious to a deluge of water. The only way to stamp out such a fire was by the use of heavy gases which would not sup-port combustion; this method being oftentimes called into service especially on ship board, where a fire in a cotton-laden vessel is always a menace. The fact of this air being present in the square bale also produced a certain tendency to re-expansion, and heavy iron bands were employed to maintain the original volume of the bale. With the method of rolling up cotton, which we are describing, a wide sheet of loose cotton fiber, technically known as a bat, is wound up on a spindle between heavy compression rolls, and as this cotton winds up on itself into a roll of constantly increasing diameter, the effect is produced of excluding air from between layers of cotton. The mechanism is so arranged that the increasing size of the bale pushes back one of the two

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# **Cotton Famine**

rollers employed, giving a constantly in-creasing resistance to the increasing size of the bale. The machine in this way is automatic, furnishing its own pressure and being driven by belt power at an expenditure of energy no greater than was formerly used on the plantation on the old-time country bale of twelve lbs. density, and with this equipment just described a density of 38 to 40 lbs. is easily obtained, and curiously enough a bale is produced that has no tendency to re-expansion and needs no bands of any kind to hold it in shape. It has a density greater than some woods and is incombustible. Insurance inspectors have maintained bonfires around these bales and have demonstrated beyond a question that it is impossible to make such a bale support combustion. The air is expelled between each layer of cotton so that the center of the bale is without oxygen. Another feature of the round bale that makes it noticeable is the ease with which it is opened up and handled by the mills. The cotton unrolls in a strong tough sheet that is fed into the pickers which forms the first operation in cot-ton mill work. The bale while comparatively new on the market is coming rapidly to the front, and has demonstrated its place on the market and the fact that it is a distinct advance in the ease of handling the principal staple of the world.

**Cotton Famine**, the destitution in England caused by the outbreak of the American Civil War (1861-65) in the English cotton manufacturing districts, especially in Lancashire. The cotton supply failed on account of the blockade of the southern ports of the U. S., and in consequence the mill owners finally closed their mills entirely—nearly two millions of people being reduced to great distress.

**Cotton-seed Oil**, a valuable oil expressed from the seeds of the cotton plant, used as an adulterant or as a substitute for various other oils. The oil cake of cotton seed is a valuable cattle-freeding substance.

Cotton-spinning, a term employed to describe in the aggregate all the operations involved in transforming raw cotton into yarn. The word "spinning" has also a more limited signification, being used to denote the concluding process of the series. The following affords a general notion of the nature and order of the successive operations carried on in the manufacture of cotton yarn: 1, Mixing, the blending of different varieties of raw cotton, in order to secure economical production, uniform quality and color, and an even thread in any de-sired degree. 2, The willowing, scratching, or blowing, an operation which cleans the cotton and prepares it in the form of a continuous lap or rolled sheet for the next process. 3, Carding, an operation in which the material is treated in its individual fibers, which are taken from the lap, further cleansed, and laid in a position approximately parallel to each other, forming a thin film, which is afterward condensed into a sliver—a round, untwisted strand of cotton 4, *Drawiny*, the drawing out of several slivers to the dimensions of one so as to

# Cougar

render the new sliver more uniform in thickness, and to place the fibers more perfectly in parallel order. 5, Slubbing, the further drawing or attenuation of the sliver, and slightly twisting it in order to preserve its cohesion and rounded form. 6. Intermediate or second slubbing, a repetition of the former operation and further attenuation, not necessary in the production of coarse yarns. 7, Roving, a continuation of the preceding, its principal object being to sfill further attenuate the sliver, and give it a slight additional twist. 8, Spinning, which completes the extension and twisting of the yarn. This is accomplished either with the throstle or the mule. By means of the for-mer machine the yarn receives a hard twist, which renders it tough and strong. By means of the latter yarns of less strength are produced, such as warps of light fabrics and wefts of all kinds. Up to the middle of the last century the only method of spinning known was that by the hand-wheel, or the still more primitive distaff and spindle. In 1767 a poor weaver of the name of Hargreaves, residing at Stanhill, near Blackburn, in Lancashire, invented a machine for spinning cotton, which he named a spinning-jenny. It consisted at first of eight spindles, turned by a horizontal wheel, but was afterward greatly extended and improved, so as to have the vertical substituted for the horizontal wheel, and give motion to from 50 to 80 spindles. In 1769 Arkwright, originally a barber's apprentice, took out a patent for spinning by rollers. From the circumstances of the mill erected by Arkwright being driven by water-power, his machine received the name of the water-frame, and the thread spun on it that of water-twist. The next important invention in cotton-spinning was that of the *mule*, introduced by Samuel Crompton, of Bolton, in 1775, and so called from its combining the principle of the spinning-jenny of Hargreaves with the roller-spinning of Arkwright. Numerous improvements in cotton-spinning have been subsequently introduced up to the present day, but they are all, more or less, modifications of Arkwright's spinning-frame and Crompton's mule-jenny. Among the prin-cipal of these may be mentioned the *throatle*, an extension and simplification of the original spinning-frame, introduced about the year 1810. The first machines set up in the U.S. were at East Bridgewater, Mass., in 1786, by two Scotchmen. In 1812 Francis C. Lowell introduced the Cartwright power-loom at Lowell, Mass., which is now the largest cotton manufacturing center in America.

**Couch** (Quitch, or Quick) **Grass**, a perennial grass, which is propagated both by seed and by its creeping root-stock, and is one of the most common and troublesome weeds of agriculture.

**Cougar** (kö'gär), a voracious quadruped of the cat kind, inhabiting most parts of America. Its color is a uniform fawn, or reddish brown, without spots or markings of any kind. It may attain a length of 9 ft., inclusive of the tail. In habits it is stealthy and cowardly, and seldom or never attacks man. It is by some called the puma or red tiger, and is one of the most destructive of all the animals of America, particularly in the warmer climates, where it carries off fowls, dogs, cats, and other domestic animals.

**Coulomb** (kö-lon), CHARLES AUGUSTIN DE (1736-1806), French physicist. His fame rests chiefly on his discoveries in electricity and magnetism, and on his invention of the torsion balance.

**Council Bluffs**, Pottawattomie co., Ta., on Missouri River. 500 mi. s. w. of Chicago. Railroads: C. B. & Q.; C. R. I. & P.; Wabash; Northwestern; and C. M. & St. P. Industries: iron works, candy factory, and others. The town was first settled in 1840. The name is derived from a council held here with the Indians in 1804. Pop. est. 1897, 22,000.

Coun' terpoint, in music, a term equivalent to harmony, or the writing of a carefully planned accompanying part; or that branch of the art which, a musical thought being given, teaches the development of it, by extension or embellishment, by transposition, repetition, or imitation throughout the different parts. Counterpoint is divided into simple, florid, or figurate, and double. Simple counterpoint is a composition in two or more parts, the notes of each part being equal in value to those of the corresponding part or parts and concords. In florid counterpoint, two or more notes are written against each note of the subject, or canto-fermo, and discords are admissible. Double counterpoint is an inversion of the parts, so that the base may become the subject, and the subject the base, etc., thus producing new melodies and new harmonies.

**Coun'tersign**, a private signal, word, or phrase given to soldiers on guard, with orders to let no man pass unless he first give that sign; a military watchword.

**County**, originally a district of a country subject to a *count* or earl. It is now a civil district corresponding with shire in England and Scotland.

**Couple**, in dynamics, two equal and parallel forces acting in different directions, and applied to the same body. The distance between their lines of action is called the *arm* of the couple, and the product of one of the two equal forces by this arm is called the moment of the couple.

**Coupling,** in machinery, a contrivance for connecting one portion of a system of shafting with another, and of which there are various forms. A common form is the flange or plate coupling, which consists of two flanges separately fitted onto the two contiguous ends of the lengths of shaft to be connected, and firmly secured together by screws. The most useful kinds of couplings are those that are adjustable, or can be readily put on and off. The term is also applied to an organ register, by which two or more rows of keys can be connected by a mechanism, so that they can be played together.

**Coupon** (kö'pon), an interest-certificate printed at the bottom of transferable bonds. and so called because it is cut off or detached and given up when a payment is made. Also one of a series of tickets which binds the issuer to make certain payments, perform some service, or give value for certain amounts at different periods, in consideration of money received.

**Courbevole** (körb-vwä) a town of France, department Seine, on the left bank of the Seine, 5 mi. n.w. of Paris, well built, with large barracks. Pop. 17,597.

**Courcelles** (kor-sal'), a village of Alsace Lorraine, 4 mi. s.e. of Metz; scene of a German victory over the French under Bazaine. Aug. 14, 1870.

**Courland**, a government in Russia, area 10. 535 sq. mi. Pop. 693,300.

**Courser** (or Courier), a genus of grallatorial birds belonging to the plover tribe. They are found chiefly in Africa.

**Court Martial**, a court consisting of military or naval officers, for the trial of military or naval offenses. In the army of the U. S. there are general courts martial, before which only officers can be tried, and regimental and garrison courts martial. In the navy, summary courts martial are held for the trial of petty officers and persons of inferior rating, and general courts martial for the trial of the higher officers.

**Courtplaster** (so called because originally applied by ladies of the court as patches on the face), black, flesh-colored, or transparent silk varnished over with a solution of isinglass. which is often perfumed with benzoin, used for covering slight wounds.

**Courtral** (kör-trā), a fortified town, Belgium, province of West Flanders, 26 mi. s. of Bruges, on the Lys. Its manufactures are table linens, lace, cambrics, cotton goods, etc., and it has extensive bleaching and dyeing works. Pop. 31,319.

Cousin (köusan), VICTOR (1792-1867), French philosopher and writer, founder of the so-called Eclectic school of philosophy. He was educated at the Lycée Charlemagne. In 1815 he became deputy professor of philosophy at the Sorbonne. He had also an appointment at the Lycée Napoléon, or Collége Henri IV, and at the Ecole Normale. In 1817 he visited Germany. He lost his position as public teacher on political grounds in 1822, and did not resume teaching till 1828, when he shared with Guizot and Villemain an unexampled popularity, due partly to political feeling. In the cabinet of Thiers in 1840 he accepted the In office of minister of public instruction. and was created a peer of France. The revolution of 1848 brought his public career to a close The head and founder of the modern school of eclecticism in France, he borrowed from many sources. His eclecticism was based on the principle that every system, however erroneous, which has anywhere commanded assent, contains some elements of truth, by which its acceptance may be explained, and that it is the business of philosophical criticism to discover and combine these scattered elements of truth.

Cousins, SAMUEL (1801-1887), English en-

graver. He engraved plates after Lawrence, Landseer, Reynolds, Millais, Leslie, Eastlake, Ward, etc. He was elected a Royal Academician Engraver in 1855, and when this class was abolished he became an Academician proper.

Couthon (kö-ton), GEORGES (1756-1794), a French revolutionist. Some time after the Revolution he was chosen a member of the national assembly. On the downfall of Robespierre's party Couthon shared, along with him and St. Just, in the decree of arrest, and was guillotined.

Covenant, ip law an agreement between two or more parties in writing signed, sealed, and delivered, whereby they agree to do, or not to do, some specified act. In theology, the promises of God as revealed in the Scriptures, conditional on certain terms on the part of man, as obedience, repentance, faith, etc.

Covent Garden, a market place in London, England, which formerly consisted of the garden belonging to the abbot and monks of Westminster. In 1831 the present market buildings were erected by the Duke of Bedford, the proprietor of the ground.

Cov'entry, a city in England, county of Warwick, 85 mi. n. w. of London. Parliaments were convened here by the earlier monarchs of England, several of whom occasionally resided in the place. Pageants and processions were celebrated in old times with great magnificence, and a remnant of these still exists in the processional show in honor of Lady Godiva. Coventry is the center of the ribbon trade. Pop. 54,755.

Cov'erture, a legal term applied to the position of a woman during marriage, because she is under the cover or protection of her husband.

Covington, Kenton co., Ky., on Ohio River opposite Cincinnati, with which it is connected by a suspension bridge over the river. Surrounding country agricultural. Railroads: Kentucky Central, and Chesapeake & Ohio. Principal industries are cigar and tobacco factories, carriage and wagon works, distilleries, breweries, flour mills, etc. There are also several pork-packing houses, glass works, and silk manufactories. Pop. est. 1897, about 40,000.

**Cow**, the general term applied to the females of the genus Bos or ox, the most valuable to man of all the ruminating animals. Among the best breeds of dairy cows are the Devonshire, the Ayrshire, the short-horn, the polled Angus or Aberdeenshire, and the Alderney.

Cowberry, red whortleberry, a procumbent shrub of high moorlands in Europe. Asia, and North America, has evergreen, box-like leaves, and produces a red acid berry used for jellies and preserves.

Cow Bunting, an American bird belonging to the family Sturnidie, or starlings. It drops its eggs into the nests of other birds to be hatched by them, but has never been known to drop more than one egg into the same nest. It is migratory, spending its winters regularly in the lower parts of North and South Carolina and Georgia, and appearing in Pennsylvania

about the end of March. These birds often frequent corn and rice fields in company with the red-winged troopials, but are more commonly found accompanying the cattle, feed- -

ing on seeds. worms, etc. Cow'itch (or cowhage), the hairs of the pods of leguminous plants, genus Mucūna, natives of the East and West Indies. The pod is covered with a thick coating of short, stiff. brittle, brown hairs, the points of which are finely serrated. They easily penetrate the skin, and produce an intolerable itching. They are employed medicinally (being taken in honey or syrup) as a mechanical vermifuge.

Cowley (kau'li), ABRAHAM (1618-1667), an English poet of great celebrity in his day b. in London. He was educated at St. John's College, Oxford. He engaged actively in the royal cause, and when the queen was obliged to quit England, Cowley accompanied her. He was absent from his native country nearly ten years, and it was principally through him that the correspondence was maintained between the king and queen. He took a considerable interest in science, and was one of the founders of the Royal Society.

Cowloon' (or Kowloon), a peninsula at the mouth of the Canton River, directly opposite to the island of Hong-Kong, to which crown colony it belongs.

Cow Parsnip, an umbelliferous plant, one species of which, found in moist woods and meadows, grows to the height of 4 or 5 ft., and is used to feed pigs. Siberian cow parsnip is grown in gardens and shrubberies, reaching the height of 10 or 12 ft.

Cowpea (Cow-grass), a variety of clover cultivated in England and some parts of the U. S. for the same purpose as the common red.

Cowper (kö'per, or kou'per) WILLIAM (1731-1800), English poet. He was the son of a clergyman; lost his mother at the age of six, and was, when ten years of age, removed from a country school to that of Westminster, which he left at eighteen with a fair reputation for classical learning, and a horror of the school discipline, which he afterward expressed in his Tirocinium. He was then articled for three years to a solicitor, where he had for a fellow clerk Mr., afterward Lord, Thurlow. At the expiration of his apprenticeship he took chambers in the Middle Temple, and in 1754 was called to the bar. The interest of his family procured for him the post of clerk to the House of Lords; but having to appear for examination at the bar of the house, his nervousness was such that on the very day appointed for the examination he resigned the office, and soon after became insane. From December, 1763, to June, 1765, he remained under the care of Doctor Cotton at St. Albans. The skill and humanity of that gentleman restored him to health, and he retired to Huntingdon. In 1776 he commenced a poem on the *Progress of Error*, which he followed by three other poems, *Truth*, Table Talk, and Expostulation; these with some others were published in a volume in 1782. One of his friends, Lady Austen, suggested the Task, which, together with Tirocinium, 39 formed a second volume in 1785. The History of John Gilpin is also due to the suggestion of Lady Austen. The translation of Homer, begun in 1784, occupied him for the next six years, and was published in 1791. He removed during its progress, in 1786, from Olney to Weston. In the beginning of 1794 he was again attacked with madness. The revisal of his Homer, and the composition of some short pieces, occupied the latter years of his life.

**Cowpox,** the vaccine disease which appears on the teats of the cow, in the form of vesicles of a blue color, approaching to livid. These vesicles are elevated at the margin and depressed at the center; they are surrounded with inflammation and contain a limpid fluid. This fluid or virus is capable of communicating genuine cowpox to the human subject. and of protecting against smallpox either completely, or, at least, against the virulent form of the disease.

**Cowrie shell,** a small gasteropodous shell, used for coin in some parts of Africa and in many parts of Southern Asia. The beauty of the cowrie shells has procured them a place among ornaments, and they have been in demand among civilized and uncivilized nations time out of memory. The shells used as currency occur principally in the Philippine Islands. They vary in value in different localities. In India 6,000 to 7,000 are equal to a rupee, while in the interior of Africa 200 are worth 16 cents.

**Cow'slip**, a fragrant and pretty wild flower found in pastures and meadows. It has umbels of small, buff-yellow, scented flowers on short pedicels. Its flowers possess sedative properties, and have been used as an anodyne, a sort of wine being prepared from them.

**Cow trees**, a name of various trees having an abundance of milky juice, especially of a South American tree, which, when wounded, yields a rich milky nutritious juice in such abundance as to render it an important article of food. This fluid resembles in appearance and quality the milk of the cow. The tree is common in Venezuela, growing to the height of 100 ft. The leaves are leathery, about 1 ft. long and 3 or 4 inches broad.

Cox, DAVID (1783-1859), an English landscape painter, b. in Birmingham. His works are chiefly of English landscape, and in water colors, a department which constituted his peculiar walk. His pictures are now very highly valued.

Cox, SAMUEL SULLIVAN (1824-1889), statesman, b. in Zanesville, O. He removed to New York City in 1866, and two years later was elected to Congress from that city and served until 1882. In 1885 he was appointed minister to Turkey, resigned the following year, and in November, 1886, again became congressman.

**Coxey**, JACOB S., American labor agitator, b. in Pennsylvania in 1854. Early in life he speculated in sandstone quarries at Massilon. O., and later became a horse breeder and owned a stock farm in Kentucky. In politics he was formerly a Greenbacker, but became a Populist and was a delegate to the St. Louis convention in 1896. Coxey advocated the issue of \$500,000,000 in bonds by the Federal government to be expended in the construction of good roads, thus giving employment to men out of work. To promote this scheme he led an army of 336 men, known as the Commonweal army, to Washington in 1894. In Washington he attempted to conduct a demonstration on the steps of the capitol and in so doing, trespassed upon the grass. He was arrested and lodged in jail. He was a candidate for Congress in Ohio in 1896.

**Coyote** (koi-ot', koi-o'tā), the American prairie wolf, is intermediate in size between the fox and the ordinary wolf. It is the Ameri-



can representative of the old world jackal. It is 36 to 40 in. long with a tail of 16 to 18 in. The voice is a kind of snapping bark, whence the name of barking wolf.

**Crab**, a popular name for all the ten-footed, short-tailed crustaceans constituting the suborder Brachyura, order Decapoda, comprising many genera, distinguished from the lobster and other macrurous or long-tailed decapods by the shortness of their tail, which is folded under the body. The head and breast are united, forming the cephalothorax, and the whole is covered with a strong carapace. The



Great Crab.

mouth has several pairs of strong jaws, in addition to which the stomach has its internal surface studded with hard projections for the purpose of grinding the food. The stomach is popularly called the "sand-bag;" a little behind it is the heart, which propels a colorless lymph (the blood) to the gills ("dead man's fingers"). The liver is the soft, rich. yellow substance, usually called the fat of the crab.

They "molt" or throw off their calcareous covering periodically. The first pair of limbs are not used for locomotion, but are furnished with strong claws or pincers. Their eyes are compound, with hexagonal facets, and are pedunculated, elongated, and movable. Like most individuals of the class, they easily lose their claws, which are as readily renewed. They generally live on decaying animal matter, though others live on vegetable substances, as the racer crabs of the West Indies, which suck the juice of the sugar cane. Most inhabit the sea, others fresh water, some the land, only going to the sea to spawn. Of the crabs, several species are highly esteemed as an article of food, and the fishery constitutes an important trade on many coasts.

**Crabbe** (krab), GEORGE (1754-1832), an English poet. His poems are all characterized by homely truthfulness, simplicity, and pathos.

**Cracow'**, the old capital of Poland, in 1815– 46 capital of a republic of the same name now forming part of Austrian Galicia, is situated on the left bank of the Vistula, where it becomes navigable, and consists of Cracow proper, or the old city, and several suburbs. The cathedral, a fine old Gothic edifice, contains monuments of many Polish kings, of Kosciusko, etc. It has a library of 300,000 volumes. On a hill near the town stands the monument of Kosciusko, 120 ft. high. Pop. 72,472.

**Crambe**, a genus of cruciferous plants, natives of Europe and Asia. They are perennial herbs, with stout branched stems and broad leaves.

Cranberry, the fruit, a native of Northern



Cranberry. a.- flower: b.- fruit.

Asia, Europe, and North America. It is also called *Moss-berry* or *Moor-berry*, as it grows only on peat-bogs or swampy land, usually among masses of sphagnum. The berry, when ripe, is globose and dark red, and a little more than  $\frac{1}{2}$  in. in diameter. These berries form a sauce of exquisite flavor, and are used for tarts. The American cranberry, a native of U. S. and Canada, is the *O. macrocarpus*. It has larger berries than the European species, and is extensively cultivated in some localities.

Crane, the common name of birds of the

genus Grus, order Grallæ, or Gralatores. They are generally of considerable size, and remarkable for their long necks and stilt-like legs, which eminently fit them for living in marshes and situations subject to inundations, where they usually seek their food. This is partly of vegetable matter, but they also devour insects, worms, frogs, lizards, reptiles, small fish, and the spawn of various aquatic animals. They build their nests among bushes or upon tussocks in marshes, and lay but two eggs. Granes annually migrate to distant regions, and perform voyages astonishing for their great length. The common crane has the general plumage ash-gray, the throat black, the rump ornamented with long, stiff, and curled feathers, the head with bristly feathers:



Crane.

legs black; length about 4 ft. It inhabits Europe, Asia, and the north of Africa. The crowned crane has the general plumage bluish ash-gray, the tail and primary quills black, the wing coverts pure white: the head is crowned with a tuft of slender yellow feathers, which can be spread out at pleasure. It inhabits North and West Africa. The demoiselle crane is so called from the elegance of its form. It is ash-gray, and the head is adorned with two tufts of feathers formed by a prolongation of the ear coverts. Its habitat is Africa and the south of Europe. Among North American species are the whooping crane, a larger species than the common crane, and the brown or sandhill crane.

**Crane,** a machine for raising great weights and depositing them at some distance from their original place, for example, raising bales from the hold of a ship and depositing them on the quay. Cranes are generally constructed on the principle of the wheel and axle, cogwheel or wheel and pinion. A very efficient wheel and pinion crane much used on quays consists of a jib or transverse beam, inclined to the vertical at an angle of from 40° to 50°, which, by means of a collar, turns on a vertical shaft. The upper end of the jib carries a fixed pulley, and the lower end a cylinder, which is put in motion by a wheel and pinion. The weight is made fast to a rope or chain which passes over the pulley and is wound round the

#### Crank

cylinder. On turning the cylinder the weight is raised as far as necessary. The jib is then turned on its arbor till the weight is brought immediately over the spot where it is to be deposited, and the moving power is withdrawn so as to allow the weight to descend by its own gravity.

Crank, an iron axis with the end bent like an elbow, serving as a handle for communicating circular motion; as, the crank of a grindstone; or for changing circular into longitudinal motion, as in some saw mills, or longitudinal into a circular motion, as in a steam engine. The single crank can only be used at the end of an axis. The double crank is em-ployed when it is necessary that the axis should be extended on both sides of the point at which the reciprocating motion is applied. An exemplification of this arrangement is afforded by the machinery of steamboats. The bell crank so called from its being much used in bell-hanging, is for a totally different purpose to the others, being used merely to change the direction of motion, as from a horizontal to a vertical line.

Cran' mer, THOMAS (1489-1556), archbishop of Canterbury, and famous for the part he played in the English reformation during the reign of Henry VIII, was b. at Aslocton, Notts. In January, 1533, he was appointed archbishop of Canterbury. He zealously pro-moted the cause of the Reformation; and through his means the Bible was translated and read in churches, and monastic institutions were vigorously suppressed. Henry VIII appointed him by will one of the Council of Regency to Edward VI. The exclusion of the Princess Mary from the crown, by the will of her brother, was a measure in which Cranmer joined the partisans of Lady Jane Grey. With others who had been most active in Lady Jane's favor he was sent to the Tower on the accession of Mary. He was tried on charges of blasphemy, perjury, incontinence, and heresy, and was sentenced to be degraded and deprived of office. Shortly afterward he was burned at the stake.

Crape, a light transparent stuff, like gauze, made of raw silk, gummed and twisted on the mill, woven without crossing, and much used in mourning.

Cra'shaw, RICHARD (1613-1649), an English poet. He displayed considerable poetic genius in the treatment of religious subjects, and though his works are almost forgotten they are said to have furnished hints to both Milton and Pope.

Crassus, MARCUS LICINIUS (B.C. 115-53), the Roman triumvir, surnamed Dires (the rich), on account of his vast riches. He took part with Sulla in the civil war; and as prætor, in B.c. 71, he defeated Spartacus and the revolted slaves at Rhegium. In B. c. 70 he was elected consul, having Pompey as his colleague; and in B.C. 60 Cæsar, Pompey, and Crassus formed the first triumvirate. Five years later he again became consul, and obtaining Syria for his province he made war on the Parthians, but was defeated and slain.

#### Crawford

Crater, the orifice or mouth of a volcano. Craters may be central or lateral, and there may be several subsidiary ones, which may shift their places, or become merged by subsidence into others.

Crati'nus, an Athenian comic poet to whom the invention of satirical comedy is attributed; d. B. c. 422. Some fragments of his works remain.

Cravat', a neckcloth; an article of silk, muslin, or other material worn by men about the neck; so called from Fr. Crarate, a Croat. because this piece of dress was adopted in the seventeenth century from the Croats who entered the French service. Toward the end of the eighteenth and the beginning of the nineteenth century, the cravat attained an in-credible degree of extravagance, but common sense at last brought in the simpler style of neckties that has since prevailed



Crawfish (or Crayfish), a name of various crustaceous animals. the common crawfish, the river lobster, a macrurous, tenfooted crustacean, resembling the lobster in appearance and habits. It inhabits the fresh waters of the U S., Europe, and the north of Asia, and is common in some of the streams of England. It lurks under stones or in holes in the banks. Its

food consists of small mollusks or fishes, the larvæ of insects, and almost any sort of animal matter. Some of them by their burrowing habits injure mill-dams and the levees of the Mississippi.

**Crawfordsville**, Montgomery co., Ind., on Sugar Creek. Railroads: Big Four, Vandalia. and Monon. Industries: wire fence, flour mill, iron foundry, woolen mill, and other small factories. Surrounding country agricultural. The town was first settled in 1823, and became a city in 1865. Pop. est. 1897, 10,000.

Crawford, FRANCIS MARION, novelist, son of Thomas C., was b. in Tuscany, Aug. 2, 1853. He had his education at Concord, New Hampshire; Trinity College, Cambridge: Karlsruhe. and Heidelberg. At Rome he devoted himself to the study of Sanskrit, and during 1879-80 was engaged in press work at Allahabad, where he was admitted to the Catholic Church. He was selected by the government committee to write the national ode at the centennial of the American Constitution, Sept. 17, 1887. His first novel, Mr. Isaacs (1882), was a book of striking and quite unusual merit, and at once



found its author an audience. The rich romantic elements in certain of the aspects and contrasts of modern Oriental life was a distinct discovery to worked-out novelists. Its successors have been Dr. Claudius, and To Leevard (1883); A Roman Singer, and An American Politician (1884): Zoroaster (1885); The Story of a Lonely Parish, and Saracinesca (1886); Marzio's Crucifix, and Paul Patoff (1887); With the Immortals (1888): and Sant' Ilario (1889). Mr. Crawford possesses imagination, originality, and direct vigor, with a graceful and vivid style, and remarkable power of description.

Crawford, THOMAS (1814-1857), sculptor. His most famous works comprise Orpheus and Cerberus, Adam and Ere, Hebe and Ganymede, Mercury and Psyche, and Dancing Jenny. He performed important works for the National Government and state of Virginia.

Crawford, WILLIAM HARRIS (1772-1834), American statesman, b. in Nelson co., Va. He was admitted to the bar in 1798. In 1800 he was appointed with Horatio Marbury to revise the laws of Georgia. He was elected to the legislature in 1802, and in 1806 to the U.S. Senate. In 1813 he declined the office of secretary of war in President Madison's cabinet, and was appointed minister to France. He returned to this country in 1815, and was made secretary of the treasury, serving through both terms of Monroe's administration. He was made judge of the northern circuit of Georgia in 1827, which office he held until the time of his death.

**Cray ons,** colored pencils obtained from certain mineral substances in their natural state, but more commonly manufactured from a fine paste of chalk or pipe-clay colored with various pigments, and consolidated by means of gum, wax, etc. A kind of *crayon painting* is practised to some extent, the coloring matter in a soft state being rubbed on with the finger. Its chief advantages consist in the great facility of its execution, and the soft beauty and richness of coloring of effects so easily produced. The paper used has a specially granulated surface.

**Cream of Tartar** (or Potassium Bitartrate) exists in grapes, tamarinds, and other foods. It is prepared from the crystalline crust, deposited on the vessels in which grape juice has been fermented. The argol is dissolved by boiling with water, the mixture filtered, and the cream of tartar allowed to crystallize out. The commercial product usually contains a small percentage of calcium tartrate. It is frequently employed in medicine for its diuretic, cathartic, and refrigerant properties; as a mordant in dyeing wool; and as an ingredient in baking powder.

**Creasy** (kre'si), SIR EDWARD SHEPHERD (1812-1878), English historian. In 1840 he was appointed professor of history at the London University, and in 1860 was made chief justice of Ceylon, receiving at the same time the honor of knighthood. His principal works are: The Rise and Progress of the British Constitution, and The Fifteen Decisive Battles of the World.

Crécy (or Cressy), a small town of France,

in the department of Somme, 100 mi. n. of Paris; pop. 1,748. It is celebrated on account of a battle fought here, Aug. 26, 1346, between the English and French.

**Cred**<sup>7</sup>**it**, in economics, is the postponement agreed on by the parties of the payment of a debt to a future day. It implies confidence of the creditor in the debtor; and a "credit system " is one of general confidence of people in each other's honesty, solvency, and resources. By means of a credit system a comparatively small stock of money can be made to do duty for carrying on a number of different transactions; but it is indispensable for every good system of credit that money must be instantly available when required, and this principle applies to every species of transaction where postponed payment is concerned. Public credit is the confidence which men entertain in the ability and disposition of a nation to make good its engagements with its creditors; or the estimation in which individuals hold the public promises of payment, whether such The term promises are expressed or implied. is also applied to the general credit of individuals in a nation; when merchants and others are wealthy and punctual in fulfilling engagements; or when they transact business with honor and fidelity; or when transfers of property are made with ease. So we speak of the credit of a bank when general confidence is placed in its ability to redeem its notes, and the credit of a mercantile house rests on its supposed ability and probity, which induce men to trust to its engagements. When the public credit is questionable it raises the premium on loans.

**Credit**, LETTER OF, an order given by bankers or others at one place to enable a person to receive money from their agents at another place.

Credit Mobilier .-- In 1852 the French government sanctioned the statutes of a new bank under the name of the Société Générale de Crédit Mobilier. The Credit Mobilier proposed to give aid to the owners of morable property. The declared object of this bank is especially to promote industrial enterprises of all kinds, such as the construction of railways, sinking of mines, etc. It was allowed to acquire shares in public companies, and to pay the calls made upon it in respect of such shares, by its own obligations (or bonds); also to sell or give in security all shares thus acquired. The operations of the society were conducted upon a very extensive scale. In 1854 it subscribed largely to the government loan on account of the Russian War, to the Grand Central Railway Company, to the General Omnibus Company of Paris, and to various other important undertakings. The dividend for this year was 12 per cent. In 1855 it loaned two sums to the government—the one of 250 and the other 375 million francs. Its operations were vast during this year, and the dividends declared amounted to 40 per cent. The public be-The public became alarmed so that, in 1856, the French government deemed it necessary to prohibit the carrying out of the proposed scheme.

This was a severe blow to the institution. In 1856 its dividends did not exceed 22 per cent.; in 1857 they were only 5 per cent. Several attempts had been made to resuscitate its credit, but failed. On Nov. 12, 1871, it was reorganized, the assets of the first society being reported at 48 million francs. In 1878 the capital was reduced from 80 millions to 32, and in 1879 raised again to 40 millions. Another reduction was made in 1884—30 million francs.

duction was made in 1884—30 million francs. The title "Crédit Mobilier of America" was adopted by a joint stock company organized in 1863, with a capital of \$2,500,000. In 1867 the charter having been purchased by a com-pany organized for the construction of the Union Pacific railroad, the stock was increased to \$37,500,000, and afterward rose to a great value, paying enormous dividends. In 1872 it became known that several members of Congress, as well as the vice president, were more or less secret stockholders. This caused a great political scandal, and led to a congressional investigation, which developed a huge attempt at bribery and corruption. An appeal was made to Congress for legislation to assist in the consummation of the work. In the course of debate it was charged that several leading advocates of the plan had been bribed by donations of large blocks of shares in return for their influence-among the culprits being the vice president of the U.S., and several senators and congressmen. As a result, resolutions of censure were passed in Congress in respect of one or more of its members, and one gentleman was sentenced to expulsion, but the sentence was never carried out. The scandal, after a time, died away, and the road proposed

was finally built and is now in operation. Creed, a summary of belief. The Nicene Creed was so called from being adopted as the creed of the church at the council of Nicæa or Nice, 325 A.D., though its terms The were subsequently somewhat altered. Apostles' Creed probably dates from the end of the fourth century; but there is no evidence of its having been accepted in its present form till the middle of the eighth. The Athanasian Creed was certainly not drawn up by St. Athanasius, as there is not sufficient evidence for its existence before the end of the eighth or beginning of the ninth century. In addition to these three creeds, the R. C. Church has the creed of Pius IV, put forth in 1564, and consisting of the Nicene Creed with additional articles adopted by the Council of Trent, to which is now added a profession of belief in the definitions of the Vatican Council. The Protestant Church adopts as "thoroughly to be received and believed" the three ancient creeds, which as part of her liturgy may be read in the Book of Common Prayer, but does not consider any of them to be inspired. The Thirty-nine Articles of the Book of Common Prayer form a confession of faith for the Anglican Church. The creed of the Church of Scotland, and other Presbyterian churches, is contained in the Confession of Faith, drawn up by the Westminster Assembly of Divines, and completed in 1646.

# Cremona

**Creedmoor,** a station on the Long Island railway, 11 mi. e. of the city of New York. It is much frequented by riflemen for target practise.

**Creeks**, American Indians formerly in Georgia and Alabama, but now planted in the Indian Territory. The number of warriors used to amount to about 6,000, but altogether the tribe does not now exceed 9,300. They have made considerable progress in agriculture, and raise horses, cattle, fowls, and hogs, and cultivate tobacco, rice, and corn.

**Creepers**, a family of birds which strongly resemble the woodpeckers in their habit of creeping on the stems of trees with the aid of



Common Creeper.

the strong quills which project from the tail feathers, and of securing their insect food by an exsertile tongue. The common creeper is European, but is represented by American species. It builds its nest usually in holes or crevices of trees. The wall creeper of Southern Europe searches for its insect food on rocks. The family is found in all parts of the world.

Cremation, the burning of the bodies of the dead, a practise which was frequent in ancient times instead of burial, and which has recently been advocated on hygienic grounds by many scientific men in Europe and America on account of the dangers to the living caused by the presence of graveyards and cemeteries. Various methods of cremation have been proposed; the great difficulty being to consume the body without permitting the escape of noxious exhalations, and without mingling the ashes with foreign substances. In Siemens's process, a modification of a plan of Sir Henry Thompson, this is successfully accomplished. Cremation societies have been instituted in every European country, and in many states of the Union.

**Cremo'na**, a city of Italy, capital of province of the same name, 47 mi. s.e. by e. Milan. The most remarkable edifice is the cathedral, begun in 1107, and completed about 1491. Close by, and connected with the cathedral, is the Torazzo, one of the loftiest and

most beautiful towers in Italy. Cremona has considerable manufactures of silk, wool, cotton, etc. It was at one time celebrated for its violins, especially those made by Antonius Stradivarius, Joseph Guarnerius, and members of the Amati family. Pop. 30,202. The province has an area of about 500 sq. mi. and a population of 300,000.

**Crenelle** (krè-nel), an embrasure in an embattled parapet or breastwork. The adjective *crenellated* is applied in architecture to a kind of embattled or indented molding of frequent occurrence in buildings of the Norman style.

**Cre'ole** is the name which was originally given to all the descendants of Spaniards born in America and the West Indies. It is now used in a wider sense to signify the descendants of Europeans of any nation born in South America and the West Indies, as well as in some other localities. *Creole dialects* are those jargons which have originated from the mixture of different languages in the West Indies, Southern U. S., etc., and spoken by the descendants of the slaves.

**Cre' osote**, a substance discovered by Reichenbach about 1813 in wood tar, from which it is separated by a tedious process. It is generally obtained, however, from the products of the destructive distillation of wood. In a pure state it is oily, heavy, colorless, has a sweetish burning taste and a strong smell of peat smoke or smoked meat. It is a powerful antiseptic. Wood treated with it is not subject to dry rot or other disease. It has been used in surgery and medicine with great success.

**Cres' cent**, an emblem representing the moon in her horned state. This emblem is of very high antiquity, being that of the Greek goddess Artemis or Diana. It is found on medals of many ancient cities, particularly of Byzantium, from whence it is supposed to have been borrowed by the Ottomans. Since their establishment in Europe it has been the universal emblem of their empire. The crescent has given name to a Turkish order of knighthood from the form of the badge, instituted by Selim, sultan of Turkey. in 1801.

Cress, the name of several species of plants, most of them of the nat. order Cruciferæ. Watercress is used as a <sup>\$</sup> salad, and is valued in medicine for its antiscorbutic qualihave a moderately pungent taste. It grows on the brinks of rivulets and in moist grounds.

**Crest**, in anc. armor, the plume or tuft of feathers, or the like, affixed to the top of the helmet. In her, the crest is a figure



Watercress.

originally intended to represent the ornament of the helmet, but is now generally placed upon a wreath, coronet, or cap of maintenance, above both helmet and shield. The crest is considered a greater criterion of nobility than the coat of arms itself, and it is now commonly a piece of the arms.

Commonly a piece of the arms. Creston, Union co., Ia., 114 mi. s.w. of Des Moines. Railroad, C. B. & Q. Industries: railroad repair shops, stock yards, etc. Surrounding country agricultural. Pop. est. 1897, 9,000.

**Creswick** (kres'ik), **THOMAS** (1811-1869), English landscape painter. His first pictures were admitted into the Academy exhibition when he was only in his seventeenth year, and his success was afterward continuous. Among his great works are England, London Road a Hundred Years Ago, and the Weald of Kent. **Creta**' ceous (or Chalk) System, in geology

**Creta** ceous (or Chalk) **System**, in geology the upper strata of the Secondary series, immediately below the Tertiary series, and superincumbent on the Oolite system. This group is common to Europe, and also to a part of Asia. It consists of chalk resting upon arenaceous and argillaceous deposits, which are also regarded as part of the system.

Crete (or Candia), one of the most important islands of the Turkish Empire, situated in the Mediterranean. Area 4,026 sq. mi. High mountains, covered with forests, run through the whole length of the island in several ranges. On the north side the island declines moderately to a fertile coast, provided with good harbors; on the south side steeply to a rocky shore, with few roadsteads; and it reaches its greatest height in Psiloriti (the ancient Ida), 7.670 ft. high, and always covered with snow. Numerous springs give fertility to most of the valleys, in which, and on the declivities of the mountains, is seen a luxuriant vegetation. The air is mild; the summer is cooled by the north winds; the winter is distinguished only by showers of rain. The island might therefore supply, as formerly, a much larger population than at present with grain, wine, and oil, wool, flax, silk. and cotton. fish, honey, game. cattle, fruits, and even with metal in abundance. But agriculture is at a very low stage, while education and the amenities of civilized life are almost entirely absent. The inhabitants (est. at 1,200,000 in ancient times, or 900,-000 in the time of the Venetians) now number about 275,000, of whom 234,000 are Christians, mostly of Greek descent. Manufactures, trade, and navigation are very insignificant. Most of the harbors are silted up. The capital, Candia, the seat of the Turkish governor, has 12,000 inhabitants; Retimo, 6.000; Canea, the most important place of trade, 8,000.

The early history of Candia is lost in the fables of Greek mythology, in which Saturn, Zeus, and Minos are spoken of as among its kings. At one time a republic, it became the seat of the Cilician pirates till conquered by the Romans, from whose hands it passed in 823 to the Saracens, and then to the Greeks again in 962. In 1204 the Byzantine sovereign sold it to the Venetians, who held it until the

### Creuse

second half of the seventeenth century, when the Turks conquered it after a desperate struggle and the siege of the capital for no less than twenty years. Insurrections against Turkish rule have more than once occurred, a formidable one fomented by Greece in 1868 was with difficulty suppressed after a tedious conflict. In 1877 another insurrection broke out, followed by a declaration of union with Greece in 1878. The inhabitants were pacified by the concession of self-government, etc., by Mukhtar Pasha; but religious difficulties gave rise to new troubles in 1884, when the Christian notables appealed to the sultan for a Christian governor, and succeeded in securing the reappointment of Photiades Pasha for a further term of five years. In 1897 a formidable insurrection took place and was supported by Greek troops. The powers of Europe interceded and blockaded the island with their fleets, while Turkey and Greece engaged in a brief but sanguinary conflict on their frontiers.

**Creuse** (kreaz), an inland department, France, comprising most part of the old province of Marche; area 2,150 sq. mi. It derives its name from the river Creuse, which rises in it, and traverses it diagonally in a northwest direction, afterward flowing on to join the Vienne. The surface is generally rugged, and the soil, which is thin and rests upon granitic rocks, is by no means fertile. Pop. 284,660.

**Crib'bage**, a favorite game at cards played with the whole pack. It may be played by two, three, or four persons; and when by two, five or six cards may be dealt to each. Five card cribbage played by two persons is the most scientific game. Sixty-one points make the game; there are no tricks and no trumps, the object being to make pairs, fifteens, sequences, or the go, or prevent the adversary from doing the same. Court cards and tens count as ten each, and all the rest count for the number of "pips" upon them. Every pair, that is, every couple of cards of the same value belonging to different suits (two aces, two fours, two kings, etc.), counts two; and when there are three or four similar cards, as many pairs are counted as there are different combinations of the cards taken two at a time. Every combination of cards, the united pips of which make up fifteen, counts two. A sequence con-sists of three or more cards of any suit following one another in rank, and counts one for When the player whose turn it is each card. to play cannot play a card without going beyond thirty-one, the other player scores one for having been the nearest to thirty-one. This is called scoring one for the "go." The remaining cards after thirty-one, or the next point to it, is made, are thrown up, and each player's cards are counted. When all the cards in a hand, either with or without the turn up card, are of one suit, or when all the cards in the crib, with the turn up card, are of one suit, it is called a flush, and counts one for each card. When the turn up card is a knave the dealer scores two ("two for his heels"). When a knave of the same suit with the turn up card is found in the hand of either player, the player

### Cricket

in whose hand it is scores one ("one for his nob").

**Crichton** (kri'ton), JAMES (1560-1585), surnamed the Admirable, a Scottish celebrity, son of Robert Crichton, lord advocate. He visited Paris, Genoa, Venice, Padua, etc., challenging all scholars to learned disputations, vanquishing doctors of the universities, and disarming the most famous swordsmen of the time in fencing. He was latterly tutor to a son of the Duke of Mantua, and is said to have been stabbed to the heart in a dastardly manner by his pupil.

**Cricket**, an insect of several species, the house cricket, the field cricket, and the mole-



Male cricket and eggs.

cricket. The house cricket is about an inch long, with antennæ of about an inch and a half, of a pale yellowish color mixed with brown. By the friction of the peculiarlyformed wing-covers the males produce that stridulous sound by which these insects are so



House cricket Gryllus domesticus; a.-full-grown larva; b.-pupa; c.-perfect insect.

well known, and which has become associated with ideas of cheerful domestic comfort. They live in holes and crevices near fire places or in other warm situations, whence they come out at night to feed on crumbs and other fragments of food. The field cricket makes a similar noise.

Cricket, the English national game played with bats, balls, and wickets on a piece of

#### Cricket

smooth greensward. It is played by two opposite sets or sides of players, generally numbering eleven each. Two *wickets* of three *stumps* each are pitched fronting each other at a distance of about 22 yds. apart, the stumps being upright rods stuck in the ground, and projecting 27 in. On the top of each set of stumps are placed two small pieces of wood called *bails*. After the rival sides, have tossed for the choice of either taking the bat or fielding, two men are sent to the wickets bat in hand. The opposite or fielding side are all simultaneously engaged; one (the bowler) being stationed behind one wicket for the purpose of bowling his ball against the opposite wicket, where his coadjutor (the wicket keeper) stands ready to catch the ball should it pass near him;





the other fielders are placed in such parts of the field as is judged most favorable for stop-ping the ball after it has been struck by the batsman or missed by the wicket keeper. It is the object of the batsman to prevent the ball delivered by the bowler reaching his wicket either by merely stopping it with his bat or by driving it away to a distant part of the field. Should the ball be driven any distance the two batsmen run across and exchange wickets, and continue to do so as long as there is no risk in being "run out," that is, of having the stumps struck by the ball while they are out of their position near the wickets. Each time the batsmen run between the wickets is counted as a "run," and is marked to the credit of the striker of the ball. If the batsman allows the ball to carry away a bail or a stump, if he knocks down any part

of his own wicket, if any part of his person stops a ball that would have otherwise reached his wicket, or if he strikes a ball so that it is caught by one of the opposite party before it reaches the ground, he is "out," that is, he gives up his bat to one of his own side; and so the game goes on until all the men on one side have played and been put out. This constitutes what is called an "innings." The other side now take the bat and try to defend their wickets and make runs as their rivals did. Generally after two innings each have been played by the contestants the game comes to an end, that side being the victors who can score the greatest number of runs.

score the greatest number of runs. Crilion (kré'yon), LOUIS DES BALBES DE BERTON DE (1541-1615), great French warrior of the sixteenth century. He distinguished himself in five successive reigns—those of Henry II, Francis II, Charles IX, Henry III, and, above all, in that of Henry IV.

Crime'a, THE, a peninsula of Southern Rus-sia, government of Taurida, to the mainland of which it is attached by the Isthmus of Perekop: area 10,000 sq. mi. Three fourths of the Crimea belongs to the region of steppes, but the other part, confined entirely to the south, and stretching along the coast from west to east, abounds in beautiful mountain scenery. Here the valleys looking southward are luxuriant with vines and olive and mulberry plantations, while the northern slope gives a large yield in cereals and fruits. The climate, however, is unequal, and in winter is severe. The chief stream is the Salghir. Others of celebrity are the Tchernaya and the The most important of the produc-Alma. tions, besides those already mentioned, are tobacco, of which a large quantity of excellent quality is produced, flax, and hemp. The forests are of limited extent. There are large numbers of fine-wooled sheep, and horned cattle and horses are reared in large numbers. Pop. est. at 450,000. The chief town and port The country was anciently is Sebastopol. associated with the Cimmerians, and in later times with various Greek settlements and minor kingdoms. After being for some time a dependency on Rome, it was overrun by successive bodies of barbarians, and in 1237 fell into the hands of the Mongols under Genghis Khan. About 1261 the Genoese were permitted to occupy and fortify Kaffa, and they rapidly extended their power in the formation of other settlements. They were expelled, however, in 1475 by Mahomet II, who made it a dependent khanate. In 1783 the Russians took possession of the country; and with the view of overawing the Turks the great naval arsenal of Sebastopol. occupying the most commanding position in the Black Sea, was begun by Catharine II in 1786. Its military resources were steadily developed up to the time of the Anglo-French campaign (see Crimean War) of 1854, when it fell into the hands of the Allies.

Crime'an War, the struggle between England, France, and Turkey, on the one hand and Russia on the other, to prevent the un-

due preponderance of Russia in the east of Europe, 1854 to 1856. The old plans for the extension of Russian power conceived by Catharine II and Potemkin were resuscitated by Nicholas I, who, believing that he had secured himself from interference on the part of Austria and Prussia, and that an Anglo-French alliance was impossible, prepared to carry them into action. Servia, Bosnia, Bulgaria, and the principalities of the Danube were to become protectorates, and Constantinople was to be provisionally occupied by Russian troops. The first markedly aggressive step-the demand by Russia for a protectorate over the Greek Church throughout the Turkish empire—brought matters to a crisis. An ulti-matum presented by Menschikoff in May, 1853 was rejected by the Porte; the Russians occupied the Danubian principalities; and war was declared by the Porte in October, 1853, by France and England in 1854, and by Sardinia in 1855. A French and English fleet entered the Baltic and captured Bomarsund and one of the Aland Islands, and in the south the allies landed at Varna, under Lord Raglan and Marshal St. Arnaud as commanders in chief. While the allies were making preparations Prussia and Austria demanded the evacuation of the Danubian principalities, and on evacuation being ordered by Nicholas "for strategic reasons." the principalities were provisionally occupied by the Austrians. It soon became obvious that the Crimea must be the seat of the war, and 50,000 French and English troops with 6,000 Turks were landed at Eupatoria (September, 1854). Five days later the battle of Alma was won by the allies (September 20), and the march continued toward the south side of Sebastopol. Soon after St. Arnaud d. and was succeeded by Canrobert. The siege of Sebastopol was commenced by a grand attack which proved a failure, and the Russians under Liprandi retaliated by attacking the English at Balaklava (October 25), but were defeated with heavy loss. It was at this battle that the famous, but useless, charge was made by the Light Brigade. A second attack at Inkerman was again repulsed by the allies, but the siege works made slow progress during the winter, in which the ill-supplied troops suffered great privations. The death of Nicholas and succession of Alexander II, in March, 1855, brought no change of policy. Canrobert resigned in favor of Pélissier; and shortly after an unsuccessful attack on those parts of the fortifications known as the Mala-khoff and Redan, Lord Raglan d., and was succeeded by Simpson. The bombardment was continued, and in September the French successfully stormed the Malakhoff, the simultaneous attack on the Redan by the British prov-ing a failure. The Russians, however, then withdrew from the city to the north forts and the allies took possession. The chief subsequent event was the capture of Kars, in Asia, by the Russians after a splendid defense by the Turks under General Williams. By this time, however, the allies had practical possession of the Crimea, and overtures of peace were gladly

accepted. A treaty was accordingly concluded at Paris on April 27, 1856, by which the independence of the Ottoman Empire was guaranteed.

**Crin'an Canal**, a canal in Argyleshire, Scotland. cutting off the peninsula of Cantyre from the mainland, and greatly shortening the route from Glasgow to Oban and other parts of the west coast: 9 mi. long. 12 ft. deep. admitting vessels of 200 tons.

Crinol' dea, the encrinites or sea-lilies, an order of Echinodermata. consisting of animals attached during the whole or a portion of their lives to the sea bottom by means of a calcareous jointed stem, from the top of which radiate feather-like flexible appendages, or arms, in the center of which is the mouth. Though comparatively few in number now, they lived in immense numbers in former ages, many carboniferous limestones being almost entirely made up of their calcareous columns and joints.

**Crin** oline, properly a kind of fabric made chiefly of horsehair, but afterward generally applied to a kind of petticoat supported by steel hoops, and intended to distend or give a certain set to the skirt of a lady's dress. A horsehair and cotton fabric used as a material for making ladies' bonnets is also called crinoline.

Cripple Creek, a mining town of Colorado, about 95 mi. s.w. of Denver. The first pay mineral was discovered in this locality by a surveyor named Lowe. He worked a claim unsuccessfully for ten years, when, in 1891, he took a partner, Robert Womack, and the lode sprang into success, being now owned by the Gold King Mining Co., and gave the impetus for the Cripple Creek of to-day. The present city of 9,000 inhabitants was five years ago the headquarters of a cattle company. The main locality of the mines first discovered is Poverty Gulch, and from this point prospecting has gone on until the territory now worked covers miles in extent, with an absolute certainty of the existence of gold in extensive adjacent regions yet unexplored. The output of the camp in gold and silver since its first pay mine began working has been as follows: 1891, \$200,000; 1892, \$600.000; 1893, \$2,500,000; 1894. \$4,000.000; 1895, \$8,100,000: 1896, \$10,000,000; and the present year (1897) bids fair to equal, if not surpass, the figures of 1896. The city of Cripple Creek is thoroughly enterprising, and its citizens have pushed forward in the face of a fire which nearly wiped out the place, until they have regained all that was lost, and now the city presents all the features of an Eastern business center, with fine schools and splendid residences, an imposing board of trade. large

and handsome churches, etc. **Crisp**, CHARLES F. (1845-1896). statesman, was b. in Sheffield, England, of American parents. After service in Confederate army he studied law: was solicitor general and judge in Georgia: member of Congress, and elected speaker fifty-second Congress.

Crittenden, JOHN J. (1787-1863), statesman, b. in Woodford co., Ky. He was a member of

# Croatia

the state legislature; of the U.S. Senate twice; governor of Kentucky; U.S. attorney general. By his influence the state of Kentucky maintained its adherence to the Union.

**Croa'tia**, a country which forms, along with Slavonia and the "Military Frontiers," a province or administrative division in the southwest of the Austrian dominions in the Hungarian portion of the monarchy, partly bounded by the Adriatic. Total area 16,411 sq. mi. The chief towns are Agram, Warasdin, and Karlstadt. Pop. 2,200,977.

**Crocid'olite**, an ornamental stone, a sort of fibrous quartz, now brought in considerable quantities from Cape Colony and made into articles of jewelry.

**Crocket,** in Gothic architecture, an ornament, usually in imitation of curved and bent foliage, but sometimes of animals, placed on



Crockets: A.-from choir of Notre Dame, Paris, circa 1160; B.-gable crocket, fourteenth century. (Le Duc.)

the angles of the sides of pinnacles, canopies, gables, etc. The name is also given to one of the terminal snags on a stag's horn.

**Crockett**, DAVID (1786-1836), American hunter and humorist. He was elected to Congress in 1827, and re-elected in 1829 and 1831. Subsequently he went to Texas, and took part in her contest of independence. He was one of the last six who defended the fort in the siege of Fort Alamo, in San Antonio de Bexar, and was captured and put to death by General Santa Anna.

Croc'odile, a genus, family, and order of saurian reptiles, comprising the largest living



Crocodile.

forms of reptiles. The characters of the order Crocodilia are as follows: The skin is covered with square bony plates; the tail is long and compressed laterally. The four feet are short,

# Croker

and there are five toes on each of the two fore feet, and four on each of the two hind feet, the latter more or less webbed; the limbs are feeble. The jaws are long and their gape of enormous width. The nostrils are at the extremity of the snout, and capable of being closed to prevent ingress of water. The heart is four-chambered. The alligators are all New World forms. The gavial proper is confined to the East Indies. The *Crocodilidæ*, to which family the crocodile belongs, have unequal teeth and no abdominal plates, and the cervical and dorsal plates are distinct for the most part. The crocodile of the Nile is the best-known member of the order; another species is met with in South Asia, Sunda, and the Moluccas. The crocodile is formidable from its great size and strength, but on shore its shortness of limb, great length of body, and difficulty of turning enable men and animals readily to escape pursuit. In the water it is active and formidable. It is exclusively carnivorous, and always prefers its food in a state of putrefaction. In Egypt it is no longer found except in the upper or more southern parts, where the heat is greatest and the population least numerous. Crocodiles are still common enough in the river Senegal, the Congo, Niger, etc. They grow sometimes to a length of 30 ft., and apparently live to a vast age.

**Crocol'sité**, a mineral, a native form of lead chromate, or red lead ore. In it chromium was first discovered.

**Crocus**, a genus of plants of the order Iridaceæ or Iris, forming one of the most common

ornaments of our gardens. Most of the species are natives of the south of Europe and the Levant; and three grow wild in Britain. They may be divided, according to their period of flowering, into *vernal* and *autumnal*.

Crossus, the last king of Lydia, son of Alyattes, whom he succeeded in 560 B.C., extending the empire from the northern and western coasts of Asia Minor to the Halys on the east and Mt. Taurus on the south, including the Greek colonies of the His riches, chiefly from mainland. obtained from mines and the gold dust of the river Pactolus, were greater than those of any king before him,



Spring Crocus.

so that his wealth became proverbial. Having entered upon war with Cyrus, he was taken prisoner in his capital, Sardis (B.C. 546). The date of his death is unknown, but he survived his captor, and is referred to in the reign of Cambyses.

Croker, JOHN WILSON (1780-1857), English writer and politician. He was one of the founders of the *Quarterly Review*, and one of its ablest contributors. His other writings include an edition of Boswell's Life of Johnson; Ulm and Trafalgar, and Talavera, two poems; Stories from the History of England, from which Sir Walter Scott derived his idea of Tales of a Grandfather; and editions of the Suffolk Papers, Lady Herry's Letters, Lord Herry's Memoirs, and Walpole's Letters.

**Croker**, THOMAS CROFTON (1798–1854), Irish collector of folk-lore. His best-known work is his Fairy Legends and Traditions of the South of Ireland.

Crom'arty, a seaport of Scotland.

**Crome**, JOHN (1769–1821), an English artist, son of a Norwich weaver. In 1805 he founded the Norwich Society of Artists. He excelled in depicting the scenery of his native county, and especially in his handling of trees; and his high place among British landscape painters is now universally acknowledged.

**Cromlech** (krom'lek), an ancient monument consisting of two or more columns of unhewn stone supporting a large tabular block so as to form a rectangular chamber, beneath the floor of which is sometimes found a cist inclosing a skeleton and relics. Sometimes the cromlech was encircled by a ring of standing-stones as in the case of the Standing-stones of Stennis, in Orkney; and sometimes it was itself buried beneath a large mound of earth.

**Crompton**, SAMUEL (1753-1827), inventor of the mule jenny. He early displayed a turn for mechanics, and when only twenty-one years of age invented his machine for spinning cotton, which was called a *mule*, from its combining the principles of Hargreaves' spinning-jenny and Arkwright's roller-frame, both invented a few years previously.

Crom' well, OLIVER (1599-1658), Lord Protector of the Commonwealth of England, Scotland, and Ireland, was b. at Huntingdon. He was educated at Sidney-Sussex College, Cambridge. He married Elizabeth, daughter of Sir James Bourchier. In 1628 he was member of Parliament. In 1631 he went with his family to a farm which he had taken at St. Ives; and in 1636 to Ely, where he had inherited a property worth nearly \$2,500 a year. In the summer of 1642 he was actively engaged in raising and drilling volunteers for the Parliamentary party. He served as captain and colonel in the earlier part of the struggle between Parliament and the king. On the occasion of the surrender of Charles by the Scottish army in 1646 Cromwell was one of the commissioners, and in the distribution of rewards for services received \$12,500 a year from the estates of the Marquis of Worcester. Affairs in Ireland demanding his presence, he was appointed lord lieutenant and commander in chief; and by making a terrible example of Drogheda, crushed the royalist party in that country within six months. Resigning the command to Ireton, he undertook at the request of the Parliament, a similar expedition against Scotland, where Charles II had been proclaimed king. He saved himself from almost inevitable disaster by the splendid victory at Dunbar (Sept. 3, 1650), and a year later put an end to the strug-

gle by his total defeat of the royalists at Worcester (Sept. 3, 1651). The Rump Parliament, as the remnant of the Long Parliament was called, had become worse than useless, and on April 20, 1653, Crom well, with 300 soldiers, dispersed that body. He then summoned a council of state, consisting mainly of his principal officers, which finally chose a Parliament of persons selected from the three kingdoms, nicknamed Barebone's Parliament. or the Little Parliament. Fifteen months after a new annual Parliament was chosen; but Cromwell soon prevailed on this body, who were totally incapable of governing, to place the charge of the com-monwealth in his hands. The chief power now devolving again upon the council of officers (Dec. 12, 1653), they declared Oliver Cromwell sole governor of the commonwealth under the name of Lord Protector, with an assistant council of twenty-one men. He refused the title of He died at Whitehall, in the sixtieth king.

year of his age. **Cromwell**, THOMAS (1490-1540), Earl of Esser. son of a blacksmith at Putney, in Surrey. He was made chief justice itinerant of the forests beyond Trent, knight of the Garter, and finally. in 1539, lord high chamberlain, and the following year Earl of Essex. He at length fell into disgrace with the king for the part he took in promoting his marriage with Anne of Cleves: and others of his political schemes failing, he was arrested on a charge of treason, and beheaded on Tower Hill.

**Cronstadt** (kron'ståt), a town of Austria, in Transylvania, after Hermannstadt, the principal seat of the industry and trade of the province, lying in a mountainous but well wooded and romantic district near its southeast corner. Pop. 29,584.

**Cronstadt**, a maritime fortress of Russia. about 20 mi. w. St. Petersburg, the most important naval station of the empire. It was founded by Peter the Great in 1710, and has spacious, regular streets with handsome houses and churches, very large marine establishments, a naval arsenal, a cannon foundry. building yards, docks, etc. Pop. 48,276.

**Cro'nus,** in ancient Greek mythology, a son of Uranus and Ge (Heaven and Earth), and youngest of the Titans. He received the government of the world after Uranus was deprived of it, and was in turn deposed by Zeus.

**Crook,** GEORGE (1828-1890), soldier; graduated at West Point in 1852. He was a captain at the outbreak of the Civil War, and he closed it a brevet major general. Thence he was transferred to Arizona, and thoroughly subdued the Piutes and Apaches. Major General Crook was in command of the department of the Missouri until his death.

**Croquet** (krô'kā), an open-air game played with balls, mallets, hoops, and pegs on a level area, which should be at least 30 yards long by 20 wide. The iron hoops (shaped like the letter U) are fixed with their two ends in the ground, arranged in a somewhat zigzag manner over the ground; they are usually ten in number. The posts or pegs (two in number) are placed at the near and far end of the field



## Crosby

respectively, marking the starting and turning points. The game may be played by any number of persons up to eight, either individually, or arranged in couples or in sides. The object of the players is to drive with their mallets the balls belonging to their own side through the hoops and against the posts in a certain order, and to prevent the balls of their opponents from completing the journey before their own by playing them against those of the enemy, and driving them as far as possible from the hoop or post to be played for; the player or players whose balls first complete the course

claiming the victory. Crosby, HowARD, Presbyterian clergyman; b. in New York, 1826. He was graduated at the New York University in 1844. In addition to contributions to periodicals, magazines, tracts, and lectures, he is the author of a number of theological works.

Cro'sier, the staff borne by some of the higher dignitaries of the Roman Catholic and other churches, and probably the oldest of the insignia of the Episcopal dignity. The original form of the staff resembled a shepherd's crook, but from the middle of the fourteenth century the archbishops began to carry, sometimes in addition to the pastoral crook, sometimes instead of it, a crosier terminating in a cross or double cross.

Cross, one straight body laid at any angle across another, or a symbol of similar shape. Among the ancients a piece of wood fastened across a tree or upright post formed a cross, on which were executed criminals of the worst class. It had, therefore, a place analogous to that of the modern gallows as an instrument of infamous punishment until it acquired honor from the crucifixion of Christ.

Cross' bill, a genus of birds of the finch family, deriving their name from a peculiarity of their bill, the mandibles of which are curved



as to cross each other, sometimes on one side and sometimes on the other. The form of the bill enables them to extract with ease the seeds of the pine, their usual food, from underneath

Crossbill.

the scales of the cones. They build and also breed at all seasons of the year, in December, as in March, April, or May. The common crossbill is found in the northern countries of Europe. It is from 6 to 61 in. in length. The male has a red plumage, the female is of a yellowish-green color. Two species of crossvellowish-green color.

billinhabit Canada and the Northern states, Cross'bow (or Arbalist), formerly a very common weapon for shooting, consisting of a



Crosse, An-

DREW (1784-A,-hand crossbow; B.-rolling-purchase crossbow. 1855), English

He applied electricphysician and scientist. ity in the production of crystals, discovered a process of purifying salt water by electricity, and also made some curious discoveries relative to the effects of positive and negative electricity on vegetation.

Cross-staff, an instrument used by surveyors consisting of a staff carrying a brass circle divided into four equal parts by two lines intersecting each other at right angles. At the extremity of each line perpendicular sights are fixed, the instrument being used in taking offsets.

Cross-trees, in ships, certain pieces of timber at the upper ends of the lower and top masts, athwart which they are laid, to sustain the frame of the tops in the one, and extend the top gallant shrouds on the other. Crotalaria, a genus of leguminous plants,

all natives of warm climates, but some of them long cultivated in hothouses.

Crotal'idæ, a family of serpents including some of the most dangerous, above all the rattlesnakes.

Cro'ton, a genus of herbaceous plants, shrubs, and trees, comprehending a great number of species, many of which possess important medical properties.

Cro'tona (Croto'na), in ancient geography, a Greek republic in Magna Gracia or South Italy, famous for its athlete, among whom the chief was Milo. It is still more celebrated as the city where Pythagoras taught between 540 and 530 B.C.

Crow, a genus of birds, type of the family Corvidæ. It includes the carrion crow, the hooded crow, the raven, the rook, and the jackdaw. The carrion crow, or simply the crow, is 18 or 19 in. in length, and about 36 between the tips of the wings. Its plumage is compact and glossy blue-black with some greenish reflections. Its favorite food is carrion of all kinds; but it also preys upon small quadrupeds, young birds, frogs, lizards, etc., and is a

confirmed robber of the nests of game birds and poultry. It is not gregarious, being generally met with either solitary or in pairs. It builds a large isolated nest, with from four to six eggs, generally of a bluish-green with blotches of brown. The carrion crow is easily tamed, and may be taught to articulate words.



Croton.

The American crow is similar to the foregoing, but is smaller and less robust, and is somewhat gregarious. The crow is common in all parts of the U. S., and is deemed a great nuisance by farmers from preying on their corn. The fish crow, another American crow, resembling the preceding but smaller, is abundant in the coast districts of the Southern states. Its favorite food is fish, but it also eats all kinds of garbage, mollusca, etc. The hooded, Royston, or gray-backed crow, is somewhat larger



#### A .- Crow; B.- Rook.

than the rook. Its head, wings, and tail are black, but less bright than in the rook; the rest of the body is a dull smoke-gray. Its food is similar to that of the carrion crow, and it builds a similar nest. The crow as a weather prophet is entitled to the highest distinction. When rain is approaching a whole community will rise from their nests or perches, wheel about for some time, and then return to their haunts.

**Crowberry** (or Crakeberry), a plant resembling the heaths, and bearing a jet-black berry, common in all the northern parts of Europe and Asia and North America. The berries, which have a slight acid taste and are sometimes eaten, afford a purple dye. The red crowberry which has a red fruit, grows in the neighborhood of the Straits of Magellan.

**Crow Blackbird**, the name of certain American birds, found in the Southern states, Mexico, and the West Indies, is 16 in. long, and of a glossy black plumage. The female is of a light-brown above and whitish beneath. The purple grackle, lesser or common crow blackbird, is similar in color to the preceding, but smaller. They reach the Middle states from the south in flocks in the latter part of March, and build in April in the tall pines or cedars. On their first arrival they feed upon insects, but afterward commit great ravages upon the young corn. In November they fly southward again.

**Crown Glass,** the hardest and most colorless kind of window glass, made almost entirely of sand and alkali and a little lime, and used in connection with fint glass for optical instruments in order to destroy the disagreeable effect of the aberration of colors.

fect of the aberration of colors. **Crown Wheel**, a wheel with cogs or teeth set at right angles to its plane, the wheel in certain watches that drives the balance.

**Croy' don**, a borough of England, in Surrey. 10 mi. s. of London, of which it is practically a suburb. The town, which is a favorite residence of merchants and business men, retired tradesmen, etc., is surrounded by fine villas, mansions, and pleasure grounds. It is a place of ancient origin, but from its recent rapid increase is almost entirely new. Of special interest are the remains of the ancient palace, long a residence of the archbishops of Canterbury. Pop. 102,697.

Cro'zet islands, a group of four uninhabited islands in the South Indian Ocean, between Kerguelen and Prince Edward Islands. They are all of volcanic origin, and the most easterly of them. East Island, has peaks exceeding 4,000 ft. The largest, Possession Island, is about 20 mi. long by 10 broad. Cru'cian Carp, a thick, broad fish, of a

**Cru'cian Carp**, a thick, broad fish, of a deep yellow color, differing from the common carp in having no barbules at its mouth, in-habiting lakes, ponds, and sluggish rivers in the north of Europe and Asia.

**Cru'cible**, a vessel employed to hold substances which are to be submitted to a high temperature without collecting the volatile products of the action. It is usually of a conical, circular, or triangular shape, closed at the bottom and open at the top, and is made



of various materials, such as fireclay, platinum, a mixture of fire clay and plumbago, porcelain, etc.

### Cruciferæ

**Crucif** eræ, a very extensive nat. order of dicotyledonous plants, consisting of herbs which all have flowers with six stamens, two of which are short, and four sepais and petals, the spreading limbs of which form a Maltese cross, whence their name. The fruit is a pod with a membranous placenta dividing it into two cells. The mustard, water-cress, turnip, cabbage, scurvy grass, radish, horse-radish, etc., belong to this family.

etc., belong to this family. **Cruden**, ALEXANDER (1701-1770), was b. at Aberdeen. His great work appeared in 1737, under the title of A Complete Concordance of the Holy Scriptures of the Old and New Testament.

**Cruikshank**, GEORGE (1792-1878), the greatest of English pictorial satirists after Hogarth, b. in London. The earliest of his drawings known is dated 1799, when he was only seven years of age, and when fifteen he was comparatively distinguished. He illustrated a number of popular books. Poorly paid for work by which others profited, he was latterly obliged to part with the vast collection of his works, and in 1866 \$250 a year was settled on him from the Royal Academy's Turner Annuities.

**Cruive** (kröv), a trap for fish, especially salmon, consisting of a sort of hedge of stakes on a tidal river or the sea beach. When the tide flows the fish swim over the wattles, but are left by the ebb.

Crusades, the wars carried on by the Christian nations of Western Europe, from the end of the eleventh till the latter half of the thirteenth century, for the conquest of Palestine. They were called Crusades, because the The anwarriors wore the sign of the cross. tagonism between the Christian and Mohammedan nations had been intensified by the possession of the Holy Land by the Turks and by their treatment of pilgrims to Jerusalem; and the first strenuous appeal was assured of response alike from the pious, the adventurous, and the greedy. The immediate cause of the first Crusade was the preaching of Peter of Amiens, or Peter the Hermit, who in 1093 had joined other pilgrims on a journey to On his return he gave Pope Jerusalem. Urban II a description of the unhappy situation of Christians in the East, and presented a petition for assistance from the Patriarch of Jerusalem. The statements of the pope at the councils of Piacenza and Clermont in 1095 produced a profound sensation throughout Europe, and in 1096 several armies set out in different divisions, most of which, being ignorant of military discipline and unprovided with necessaries, were destroyed before reaching Constantinople, which had been chosen for their place of meeting. A well-conducted regular army, however, of 80.000 men was headed by Godfrey of Bouillon; Hugh of Vermandois, brother to Philip, king of France; Baldwin, brother of Godfrey; Robert II of Flanders; Robert II of Normandy, brother of William II, king of England; Raymond of Toulouse: and other heroes. They traversed Germany, Hungary, and the Byzantine Empire, passed over into Asia Minor, conquered Nicæa in June, 1097, and shortly after, on July 4, fought the

first pitched battle at Dorylæum, being com-pletely victorious after a severe contest. They then marched through Asia Minor upon Antioch, which, with the exception of the citadei, fell into their hands by treachery in June, 1098. Surrounded in turn by a Turkish army, they were soon reduced to pitiable straits, but succeeded in routing their besiegers on June 28. After remaining nearly a year in the neighborhood of Antioch they commenced, in May, 1099, their march against Jerusalem, the siege Their of which they commenced in June. numbers were now reduced to little more than 20,000 men; but after a fierce struggle the town was taken by storm on July 15, and Godfrey of Bouillon was chosen king of Jerusalem, or, as he preferred to term himself, Protector of the Holy Sepulcher.

The eccond great and regularly-conducted Crusade was occasioned by the loss of Edessa, which the Saracens conquered in December. 1144. Fearing still graver losses, Pope Eugenius III, seconded by Bernard of Clairvaux, exhorted the German emperor Conrad III, and the king of France, Louis VII, to defend the cross. Both these monarchs obeyed, and in 1147 led large forces to the East, but returned without accomplishing anything in 1149.

The third Crusade was undertaken after the capture of Jerusalem by Saladin in 1187, the monarchs Frederick I (Barbarossa) of Germany, Philip Augustus of France, and Richard I (Cœur de Lion) of England, leading their armies in person. Richard and Philip Augustus met at Vezelai in June, 1190, and agreed to unite their forces at Messina in Sicily where they spent six months at the end of 1190 and beginning of 1191. Philip joined the other Crusaders before Acre on April 13, 1191; but Richard, whose fleet was separated by a storm, went to Cyprus, and, dispossessing Isaac Comnenus, made himself king. Jealousies arose between the monarchs, and within a few weeks after the fall of Acre the French king returned to Europe. Richard, now sole leader of the expedition, defeated Saladin and occupied Jaffa or Joppa; but having twice vainly set out with the design of besieging Jerusalem, he concluded (Sept. 2, 1192) a truce of three years and three months with Saladin, who agreed that pilgrims should be free to visit the Holy Sepulcher, and that the whole sea coast from Tyre to Jaffa (including the important fortress of Acre) should belong to the Crusaders.

The *jourth* Crusade was set on foot by Pope Innocent III, who commissioned Fulk of Neuilly to preach it in 1198. Among its chief promoters was Godfrey of Villehardouin, seneschal of Champagne; Baldwin, count of Flanders and Hainaut: Dandolo, the aged doge of Venice: and the Marquis of Montferrat, who was chosen leader. The Crusaders assembled at Venice in the spring of 1202, but were diverted from their original purpose first by the capture of the Dalmatan town of Zara, and then by the expedition which ended in the sack of Constantinople and the establishment of a Latin empire there (1204).

The fifth Crusade, undertaken by Andreas

of Hungary in 1217, and shared in by John of Brienne, to whom the title of King of Jerusalem was given, had little other result than the temporary occupation of the Nile delta.

The sixth Crusade, that of Frederick II, emperor of Germany, was undertaken at the instance of Popes Honorious III and Gregory IX. On arriving he entered into negotiations with the Sultan of Egypt, and without any fighting recovered for himself, as heir of John of Brienne, the kingdom of Judea, on the condition of tolerating in his kingdom the Mohammedan worship. He then concluded a useless truce of ten years, got himself crowned at Jerusalem, and returned in 1229.

The seventh and eighth Crusades were led by St. Louis of France (Louis IX) in person. Πe took Damietta in June, 1249, and marched up the Nile, but was compelled to retreat, and finally to surrender with his whole army. The finally to surrender with his whole army. second expedition of Louis was still more disastrous in its results than the first. He landed his army in 1270 on the northern coast of Africa; but he himself and a large number of his knights died before Tunis, and the majority of the French Crusaders returned home. A crusading army under Prince Edward of England (afterward Edward I), originally intended to co-operate with that of Louis, landed at Acre in 1271, but little was effected beyond a new truce for ten years (1272). For nineteen years longer the Christians in Palestine held with great difficulty the remnants of the Latin kingdom there. But Tyre and Berytus (Beyrout) were successively snatched from them, and finally the capture of Acre by the Sultan of Egypt in 1291 put an end to the kingdom founded by the Crusaders.

Despite their want of success, however, the Crusades were of considerable indirect value in that by these joint enterprises the European nations became more connected with each other, the class of citizens increased in influence, partly because the nobility suffered by extravagant contributions to the Crusades, and partly because a more intimate commercial intercourse greatly augmented the wealth of the cities, and a number of arts and sciences. till then unknown in Europe, were introduced.

**Crusta'cea**, one of the primary branches into which is divided the great group of Articulate or Annulose animals. The body is divided into head, thorax, and abdomen, of which the two former are united into a single mass, cephalothorax, covered with a shield or carapace, and the abdomen usually presents the appearance of a tail. In some—the sand hopper, wood louse, etc.—the head is partially distinct from the thorax. The Crustacea breathe by branchiæ or gills, or by membranous vesicles. or by the general surface; and the body is composed of a series of rings more or less distinct. They possess the faculty of reproducing lost parts in an eminent degree. The integument is chitinous and remains elastic in some, as the Isopods, throughout life. But in the majority it is calcified or transformed into a hard shell, prisms of carbonate of lime being deposited in

#### Crystallomancy

the outer layer. It consists of a great number of distinct pieces connected together by portions of the epidermic envelope, just as among the higher animals certain bones are connected together by cartilages. Several species, if not all, molt or cast these outer skeletons or shells in the progress of growth; this is the case with crabs, crayfish, etc. The general grouping of the Crustacea is sometimes based upon the successive metamorphoses which the higher Crustaceans undergo before reaching the adult form. Thus the first stage of the lobster embryo is that of a minute object with three pairs of limbs, known as the Nauplius form; in the second stage, the cephalo thorax is provided with anterior, posterior, and lateral spines; the final form being reached by a series of moltings.

Cry'olite (or Kryolite), a mineral, a native fluoride of aluminium and socium, found at Evigtok, in Greenland, whence it is exported. It is of a pale grayish-white or yellowish brown, occurs in masses of a foliated structure, and has a vitreous luster. It has been employed as a source of aluminum, and in the manufacture of a hard porcelanous glass of great beauty.

**Cryoph'orous**, an instrument for showing the diminution of temperature in water by its own evaporation. Wollaston's cryophorous consists of two glass globes united by a moderately wide glass tube. Water is poured in and boiled to expel the air, and while boiling the apparatus is hermetically sealed. When it is to be used the water is made to run into one of the globes, and the other is buried in a freezing mixture. The aqueous vapor in the globe being thus condensed, a vacuum is produced. fresh vapor rises from the water in the other globe, which is again condensed, and this proceeds continuously till the water remaining in the globe has been, by the evaporation.

cooled to the freezing-point. **Cryptog'amous Plants** (Cryptogamia). in botany, the division embracing the lower classes of plants having no evident flowers or in which the reproductive organs are obscure.

**Cryptog' raphy**, the art of writing in secret characters or cipher, or with sympathetic ink. The simplest method consists in choosing for every letter of the alphabet some sign, or another letter or group of letters.

**Crystal**, in chemistry and mineralogy. any body which, by the mutual attraction of its particles, has assumed the form of some one of the regular geometric solids, being bounded by a certain number of plane surfaces. The chemist procures crystals either by fusing the bodies by heat and then allowing them gradually to cool, or by dissolving them in a fluid and then abstracting the fluid by slow evaporation.

**Crys' talline Rocks**, rocks of a crystalline texture. such as granite, believed to have acquired this character by the action of heat and pressure.

**Crystal lomancy**, a mode of divining by means of a transparent body, as a precious stone, crystal globe, etc. The operator first muttered over it certain formulas of prayer. and then gave the crystal (a beryl was pre-

ferred) into the hands of a young man or virgin, who received an answer from the spirits within the crystal.

Cuba, the largest and most important of the West Indies, has a delightful climate, rich soil, and luxuriant tropical growth, and en-chanting natural scenery. Its coast line of 1,600 mi. furnishes no less than twenty-seven excellent harbors. This advantage, combined with its favored position at the entrance of the Gulf of Mexico, gives it a commercial value incomparable with the extent of its territory, which, including the Isles of Pines and some other small islands, aggregate about 43,825 sq. mi. The island measures from east to west 760 mi., and is traversed by a mountain range, the most elevated summit of which is 7,670 ft. From this central water-shed, short rivers flow north and south. One half of the island is covered with forests filled with a dense growth of underbrush, while the dry plains are a jungle of bushes and grass, which, during the rainy season, become impassable These natural conditions have been swamps. a great aid to the insurgents during the present revolution (1896-97). Havana, the capital, has an equable temperature, the mean average ranging from  $77^\circ$  to  $80^\circ$ . The foundation of this city dates from 1519, being the oldest city in America founded by Europeans. The cen-sus of 1887 showed a population of 200,408. The venerable cathedral, supposed to contain in an urn the bones of Columbus, is here, as well as the famous Moro Castle, in which so many political prisoners, including many Americans, have been incarcerated. For defense of the harbor newer fortifications have been erected on neighboring heights. At Havana and in other seaports yellow fever pre-vails during the summer. Santiago on the south, Matanzas on the north, and Puerto Principe inland, are the cities next in order of population. The principal products of Cuba are sugar,

tobacco, and coffee. Maize is indigenous; two crops are produced each year. Rice in small quantities is grown. Oranges and bananas have value as export articles, while mahogany and cedar woods come next in importance. Pineapples, melons, lemons, limes, figs, and strawberries are quite extensively cultivated. In Cuba the sugar planter is the prince of agriculture. The grinding season lasts twice as long as in Louisiana. The production of sugar is now about one million tons per annum, but it is estimated that the island is capable of yielding five times as much. The Spanish government has control of the tobacco trade and imposes restrictions that make the profits to the producer uncertain; for this reason those interested in the tobacco industry usually favor the revolution. The richest tobacco region in the world is the province Pinar del Coffee culture was introduced from Rio. Hayti (1748). Impetus was given to coffee culture by the superior methods brought in by French planters who fied from San Do-mingo (1798). Competition with Brazil long since crippled the coffee trade in Cuba. The

most important mineral product is bituminous coal, though copper, iron, and even gold and silver are found. The latest census gives the population of Cuba about 1,631,619, one third of whom are colored. The whole island excepting Havana was, for many years, neglected by the Spanish owners. Consequently whenever Europe was engaged in war with Spain. Cuban waters were the scenes of bloody combat. Havana was destroyed by the French 1534, and again in 1554. In 1624 it was captured by the Dutch but subsequently restored to Spain. Havana was captured by the English assisted by the colonies of New York, New Jersey, and Connecticut in 1762, but within a year was exchanged for Florida. When in 1808 the French deposed the reigning family in Spain, Cuba declared war against Napoleon. From 1810 Cuba was governed by a foreign captain general. His government combined with excessive taxation caused discontent, which became defiance in 1836 when Cuba was denied the benefits of the new constitution granted Spain. In 1844 and 1848 there were insurrections of the negroes, but these were soon quelled. The U.S. wishing to extend its slave territory (1848), offered to buy Cuba. The Ostend Manifesto issued in 1854 declared that if Spain would not sell Cuba, the U.S. should seize and annex the island. Before this, an attempt had been made (1850-1851) by Narcisso Lopez, assisted by adventurers from the U. S., to seize Cuba. The Cubans themselves repelled the intruders. During the ten years' war for Cuban independence which began in 1868 under the famous Maximo Gomez, Captain Fry of the Virginius with fifty-two other American prisoners, was shot (1873) at Santiago, condemned as pirates. This war was terminated 1878 by the treaty of Elzanjon with Martinez Campos, acting captain general. By this treaty personal rights were granted the Cubans and the early abolishment of slav-ery provided for. The promises were fair but the fulfillment false. Nothing was really changed; the government was mal-administered under softer names. Captain general became governor general, and the "law of vagrancy" took the place of the right of ban-ishment. Taxation without the consent of the Cubans still existed. Native Cubans were excluded from offices of influence. The whole island was still governed in the interests of The mother country had but one Spain. policy for Cuba: to raise the largest revenue possible, and give the people the smallest return. Export duties were laid on her products and tariff on her imports. The Cuban deputies in the Cortes at Madrid were without power or influence. Slavery was abolished in 1886, since which time Cuba has suffered from scarcity of labor, for in 1873 the Chinese government had stopped the emigration of its subjects to this island, and the negro population had been diminished by excessive infant mortality.

Cuban exiles continued to agitate for "Cuba libre," and in 1894 a revolutionary council was formed with Jose Marti as leader, and head-



quarters at New York. Arms were smuggled into Cuba, and secret preparations were going on at home and abroad. In January, 1895, a filibustering expedition, organized by Antonio Maceo and Jose Marti at Fernandina, Fla., was broken up on the eve of sailing. The formal declaration of war bears date Feb. 24, 1895. Maximo Gomez was given command of the revolutionary forces. The insurgents carried revolutionary forces. on guerrilla warfare, playing hide and seek with the Spanish forces in the mountains and swamps. A plot to exterminate the Spanish soldiery and to burn everything burnable came to light, and Callya, the governor general, proclaimed martial law in the threatened provinces. Raids were made upon the plantations, the crops ruined, and the laborers enticed away, but the Spanish troops operated without success, for the insurgents would disappear in the mountains and swamps at their approach. The rebels themselves were handicapped by the attitude of the autonomists who, while complaining bitterly against Spanish misrule, were unwilling to fight, limiting their demands Nearly all the negroes belong lionary party. Those holding to home-rule. to the revolutionary party. office and those of Spanish birth make up the royalist party. March, 1895, Maceo landed from Costa Rica and made his way through the eastern part of the island until he met a body of rebels who hailed his coming with joy. He and his brother Jose were made generals. In April of the same year Maximo Gomez and Jose Marti landed from San Domingo. Gomez was immediately made commander-in-The rebels now took fresh courage, chief. remembering their leaders' prowess in the former war. Marti, wishing to go to the U.S., set out May 19, but was led into ambush by a treacherous guide and killed almost in sight of camp. Governor general Callega had been relieved in April by field marshal Campos. The revolt went on with the advantage to the rebels that they were kept informed of the movements of the government troops. Campos divided the island into belts running military lines north and south, hoping thus to crowd the rebels off the island. On the contrary, he failed in the campaign of 1895, and went home to Spain to make way for the cruel, Gen. Valeriano Weyler, who arrived February, 1896. He found the insurgents near Havana, they having in their westward march laid waste the whole country. At the end of 1895 Spain had 200,-000 men in the field and the insurgents about 60,000. Weyler tried in vain to prevent concert of action between Gomez and Maceo (the lat-ter being in Pinar del Rio province), by throwing trochas, lines of fortified posts close together, across the island. Dec. 6, 1896, Maceo was killed, probably through the treachery The campaign of Dr. Zertucha of his staff. of 1897 is still going on and the insurgents have possession of nearly two thirds of the island. They have drawn up a form of government borrowed from American and Spanish models. The Spanish government has sent agents to treat with the rebels, but they are unwilling to consider anything short of independence.

**Cubic Niter** (or Chile Saltpeter), the nitrate of sodium found chiefly in the rainless district of Tarapacá in Chile, where it occurs for the most part mixed with other salts, sand, and clay. It crystallizes in obtuse-angled rhombohedra, not in cubes, and is used in considerable quantities both as a dressing for grass and mixed in artificial manures.

**Cuck' oo**, a scansorial or climbing bird, the type of the family Cuculidæ. The note from which it derives its name is a love call used only in the mating season. The greater number of species belonging to the genus are confined to summer countries, more especially India and Africa, though some are summer visitants of colder climates. The adult bird is ashy-gray, with a white breast barred across with narrow lines of grayish black; tail spotted and barred with white; bill black, touched at the gape with yellow; eyes and feet yellow. It appears in England about the middle of April, and in May begins to deposit its eggs in the nests of other species; giving the preference to those of the hedge sparrow, meadow pipit, or pied wagtail.



Cuckoo.

The young cuckoo ejects from the nest its young companions, and monopolizes the attentions of its foster parents, which feed it for about five weeks after it is fledged. The young birds do not leave the country until the end of August or even September; but the adult birds commence their flight southward in July or at latest early in August. Their food consists chiefly of cockchafers, moths, dragon flies, and caterpillars, though young cuckoos will sometimes eat berries. There appears to be a curious preponderance of male as compared with female birds, a low estimate putting the ratio at about five to one.

**Cuckoo Flower** (or Lady's smock), a common and pretty meadow plant, order Cruciferæ, with pale lilac or white flowers. It possesses antiscorbutic properties.

Cu'cumber, the fruit of *Cucamis satīrus*, or the plant itself, belonging to the Cucurbitaceæ or gourd order, and supposed to have been originally imported into Europe from the Levant. It is an annual with rough trailing stems, large angular leaves, and yellow male
and female flowers set in the axils of the leaf stalks.

**Cucumber Tree**, a fine forest tree, so named from the appearance of its fruit.

**Cucurbita ceæ**, the gourd order, consisting of large herbaceous plants, annual or perennial, with alternate leaves palmately veined and scabrous, and unisexual flowers. The corolla is monopetalous, regular, and with five lobes; the petals, usually either yellow, white, or green, and deeply veined; the fruit fleshy and succulent. The stems are scabrous, and the general habit is climbing or trailing, by means of tendrils. The order contains at least fifty-six genera and about 300 known species, and abounds in useful or remarkable plants, including the melon, gourd, cucumber, colocynth, bryony, etc. They are natives of both hemispheres, chiefly within the tropics. The annuals, however, are common in our gardens. **Cuddalore**' (or Kúdalúr), a maritime town

**Cuddalore**' (or Kúdalúr), a maritime town in Hindustan, presidency of Madras and district of South Arcot, 86 mi. s. of Madras. It was formerly a place of great strength and importance, and still carries on a large land trade with Madras in indigo, oils, and sugar. It also exports grain and rice. Pop. 43,545.

**Cud' dapah** (or Kadapa), a district and town, Hindustan, presidency Madras. The district, of which the area is 8,745 sq. mi., is traversed north to south by the Eastern Ghauts, and watered by the Pennar and its affluents. The forests contain much valuable timber, and the minerals include iron ore, lead, copper, diamonds, etc. Agriculture is in a flourishing condition, grain, cotton, and indigo being largely grown. Pop. 1,121,038. The town lies on a small river of same name, an affluent of the Pennar, 140 mi. n. w. Madras. It exports indigo and cotton. Pop. 18,982.

**Cuen'ca**, a town of Ecuador, next to Quito the most important in the country, with a cathedral and university. Pop. 30,000.

**Cufic,** a term derived from the town of Cufa or Kufa, in the pashalic of Bagdad, and applied to a certain class of Arabic written characters. The Cufic characters were the written characters of the Arabian alphabet in use from about the sixth century of the Christian era until about the eleventh. They are said to have been invented at Cufa, and were in use at the time of the composition of the Koran.

**Cullo den Moor,** a heath in Scotland, 4 mi. e. of Inverness, celebrated for the victory obtained April 27, 1746 by the Duke of Cumberland over Prince Charles Edward Stuart (the Pretender) and his adherents. The battle was the last fought on British soil, and the termination of the attempts of the Stuart family to recover the throne of England.

**Cullom,** SHELBY M., statesman b. in Wayne co., Ky. 1829; studied law and practised at Springfield, Ill. In 1876 he became governor of Ill. He was elected U. S. senator in 1883, which position he still holds.

**Cullum,** GEORGE W., engineer, b. in New York City, 1809, graduated at West Point in 1833 and entered the engineer corps. He built Fort Sumter and other Atlantic harbor defenses. Cu mæ, a very ancient city of Italy, in Campania, the oldest colony of the Greeks in Italy, founded about 1030 B.c. by colonists from Chalcis, in Eubea, and from Cyme in Asia Minor. It founded Naples, and in Sicily Zancle or Messina. In 420 B.c. Cumæ was taken by the Campanians, and came with them under the power of Rome (345 B.c.). It was destroyed A. D. 1207, and a few ruins only now exist.

**Cumana'**, a town of Venezuela. It is the oldest European city in the New World, having been founded in 1523. It lies near the mouth of the Gulf of Cariaco, and has a good roadstead in Cumana Bay, with a trade in cacao, sugar, tobacco, etc. Pop. 12,051.

**Cum' berland,** the extreme northwestern county of England. Area 970,161 acres. Carlisle is the county town; the other principal towns are the seaports Whitehaven, Workington, and Maryport; and the inland towns Penrith, Cockermouth, and Keswick. Pop. 266,-550.

**Cumberland**, Providence co., R. I.; a manufacturing town. Pop. 8,090.

**Cumberland**, Alleghany co., Md., on Potomac River, 150 mi. from Washington. Railroads: B. & O.; Pennsylvania; C. & P.; W. Va. C. & P.; and G. C. & C. Industries: railroad shops. four flouring mills, three iron foundries, three glass, three cement, steel shafting, and tin plate factories. Surrounding country agricultural and mineral. Fort Necessity was established by General Washington-destroyed by French in 1754, and Fort Cumberland garrisoned 1754-55. 1787 a survey of Cumberland was ordered, and in 1876 George Dent (fatherin-law of General Grant) made a plat of the town. In 1815 the town was incorporated, and in 1816 the first city council was elected. Pop. est. 1897, 15,300.

**Cumberland**, a river of the U. S. which runs through Kentucky and Tennessee into the Ohio, having a course of about 600 mi., navigable for steamboats to Nashville, nearly 200 mi.

**Cumberland Mountains**, in Tennessee part of a range of the Appalachian system; rarely exceeding 2,000 ft. in height.

**Cum in** (or Cum min), an umbelliferous plant which grows wild in Egypt and Syria, and is largely cultivated in Sicily and Malta. whence it is exported. The fruit, called cumin seeds, is of a light brown color, with an aromatic smell and caraway-like taste, and possesses stimulating and carminative properties.

Cumminsville, Hamilton co., O., near Ohio River, 5 mi. n. and part of city of Cincinnati by annexation. Railroads: C. H. & D.; Dayton Short Line: B. & O.; and three lines of Cincinnati street railway. Industries: two flouring mills, shoe, pearl button, harness. cigar, and other small factories. Surrounding country agricultural. The town was first settled in 1788; it was the scene of "Mad Anthony" Wayne's battles with the Indians. Pop. est. 1897, 15,000.

Cundinamarca, one of the departments of the Republic of Colombia. Area est, 79,810 sq. mi.; pop. 537,658.

## **Cuneiform Inscriptions**

Cune' iform inscriptions, the name applied to the wedge-shaped characters of the inscriptions on old Babylon and Persian monuments; sometimes also described as arrow-headed or nail-headed characters. They appear to have been originally of the nature of hieroglyphs, and to have been invented by the primitive Accadian inhabitants of Chaldea, from whom they were borrowed with considerable modification by the conquering Babylonians and Assyrians, who were Semites by race and spoke an entirely different language. The use of the character, however, ceased shortly after the reign of Alexander the Great; and after the lapse of nearly two thousand years it was doubted by many if the signs had ever had an intelligible meaning. They were even regarded by some as the work of a species of worm, by others as mere talismanic signs, astrological symbols, and the like. The first hints toward decipherment were given by Karstens Niebuhr late in the eighteenth century; and the labors of Grotefend, Rask, Bur-nouf, Lassen, Rawlinson, and other investigators slowly perfected the means of translation. Most of the inscriptions first discovered were in three different languages and as many varieties of cuneiform writing, the most promi-nent, and at the same time the simplest and latest, being the Persian cuneiform writing with about sixty letters. Next older in time and much more complex is what is designated the Assyrian or Babylonian system of writing, consisting of from 600 to 700 characters, partly alphabetic, partly syllabic, or representing sound groups. Lastly comes the Accadian inscriptions, the oldest of all, originally proceeding from a people who had reached a high state of civilization three thousand years before Christ, and whose language (allied to Turkish) ceased to be a living tongue about 1700 B.C. The most celebrated trilingual inscription is that at Behistun, cut upon the face of a rock 1,700 ft. high, and recording a portion of the history of Darius. The British Museum contains many thousands of inscribed clay tablets, cylinders, prisms, etc., the decipherment of which is in progress. See also Assyria.

Cu'pola, in architecture, a spherical vault on the top of an edifice; a dome or the round top of a dome. The Italian word *cupola* signifies a hemispherical roof which covers a circular building, like the Pantheon at Rome and the Round Temple of Vesta at Tivoli. The term is also applied distinctively to the concave interior as opposed to the dome forming its exterior.

**Cupping,** a surgical operation consisting in the application of the cupping-glass in cases where it is desirable to abstract blood from, or draw it to, a particular part. When blood is removed the operation is simply termed cupping; when no blood is abstracted, it is drgcupping. The cupping-glass, a cup-shaped glass vessel, is first held over the flame of a spirit lamp, by which means the included air is rarefied. In this state it is applied to the skin, and as the heated air cools it contracts and produces a partial vacuum, so that the skin and

# Curbroof

integuments are drawn up slightly into the glass and become swollen. If blood is to be drawn, a scarificator or spring-lancet is generally used.

ally used. Curaçoa (kö-rå-so'a), an island, Dutch West of Venezuela; 36 mi. long and 8 mi., broad; capital Willemstad, principal harbor Santa Anna. It is hilly, wild, and barren, with a hot, dry climate. Yellow fever visits it every sixth or seventh year. Fresh water is scarce, and serious droughts occur. The tamarind, cocoapalm, banana, and other useful trees are reared -among them three varieties of orange, from one of which the Curaçoa liquor is made. Sugar, tobacco, cochineal, and maize are also produced, but the staple exports are salt, and a valuable phosphate of lime used as a manure in its natural state, or made to yield valuable superphosphates. The islands of Curaçoa, Bonaire, Oruba (or Aruba), and Little Curaçoa, form a Dutch government, the residence of the governor being at Willemstad. From the sixteenth century Curaçoa was held in succession by the Spaniards, Dutch, and British, and finally ceded to Holland at the general peace in 1814. Pop. 25,421; including the dependencies, 44,734.

**Curaçoa** (or Curaçao), a liquor or cordial prepared from a peculiar kind of bitter oranges growing in Curaçoa, which have a persistent aromatic odor and taste. It is prepared from the yellow part of the rind, which is steeped in strong alcohol, the infusion being afterward distilled and rectified and mixed with syrup. For the true orange, the common bitter orange of Europe is often substituted, and the genuine deep-vellow color imitated by caramel. etc.

deep-yellow color imitated by caramel, etc. **Cu'rari** (Cu'rara, Urara, Woorali), the wellknown arrow poison of the Indians in Spanish Guiana and in Northern Brazil. It is the aqueous extract of a tree, the *Strych nos toxifera*, thickened with a mucilaginous matter; and its properties are such that if introduced into a scratch or puncture of the skin, so as to mix with the blood, it causes death by paralysis of the nerves of the respiratory organs. It may, however, be introduced in moderate doses into the alimentary canal without injury, and animals killed by it are wholesome as food. The active principle is called *curarin*.

**Curas' sow** (or Hocco), the name given to gallinaceous birds of the genus Crax, family Cracidæ; natives of the warm parts of America. The crested curassow, found in Guiana, Mexico, and Brazil, is a handsome bird, nearly as large as the turkey and more imposing in appearance, being of a dark violet color, with a purplish-green gloss above and on the breast: the abdomen is snow white, and the crest golden. Another species is the red curassow, also a native of South America, and about the size of a turkey. The cushew bird is called the galeated curassow.

**Curbroof**, in architecture, a roof in which the rafters, instead of continuing straight down from the ridge to the walls, are at a given height received on plates, which in their turn are supported by rafters less inclined to the horizon, so that this kind of roof presents a bent appearance, whence its name.

**Curb-sender**, an automatic signaling apparatus used in submarine telegraphy. The message is punched on a paper ribbon, which is then passed through the transmitting apparatus by clockwork. The name is due to the fact that when a current of one kind of electricity is sent by the instrument, another of the opposite kind is sent immediately after



#### Crested Curassow.

to curb the first, the effect of the second transmission being to make the indication produced by the first sharp and distinct, instead of slow and uncertain.

Cur'few, a practise originated in England by William the Conqueror, who directed that at the ringing of the bell at eight o'clock all fires and lights should be extinguished. The law was repealed by Henry I in 1100, but the bell continued to be rung in many districts to modern times, and probably may still be heard. Similar ordinances for keeping children off the streets have been passed in some of our American cities. The name was also given formerly to a domestic utensil for covering up a fire.

**Curlew**, a genus of birds belonging to the order Grallatores, or Waders, and of the same family as the snipe and woodcock. The genus



Common Curlew.

is characterized by a very long, slender, and arcuated bill, tall and partly naked legs, and a short somewhat rounded tail. The bill is more or less covered with a soft sensitive skin by

## Currants

which the bird is enabled to detect its food in the mud.

Curling, a favorite Scottish winter amuse-



ment on the ice, in which contending parties slide large smooth stones having somewhat the shape of a flattened hemisphere, weighing from 30 to 45 lbs, each, with an iron or wooden handle at the top, from one mark

Curling Stone. to another. The object of the player is to lay his stone as near to the mark as possible, to guard that of his partner which has been well laid before, or to strike off that of his antagonist.

**Curr'agh**, a plain or common in Ireland. Kildare county, the property of the crown and the site of the chief military encampment in Ireland, formed in 1855, and having accommodation for 12,000 troops.

Cur'ran, JOHN PHILPOT (1750-1817), Irish advocate and politician. His eloquence, wit. and ability made him the most popular advocate of his age and country.

Cur'rant, the name of two well-known skrubs, order Grossulariaceæ, cultivated in

gardens for their The red curfruit. rant. Ribes rubrum. the fruit of which is used principally for tarts and jellies, is a native of Southern Europe, Asia, and North America. The white currant is a cultivated variety of the red, and is used chiefly for dessert and for conversion into wine. The black currant, R. nigrum, a native to most parts of Europe, and found abundantly in Russia and Siberia, is used for tarts and puddings, and for a jelly recomfine mended in cases of sore throat.

**Currants,** a small kind of dried grape imported from the Levant, chiefly from the vicinity of Patras in the Morea, as also from Zante,



Cephalonia, and Ithaca, of which islands they are the staple produce. The plant is delicate and the crop precarious, and as the plantation must be six or seven years old before it bears, its cultivation requires a great outlay of capital. After being dried the currants are exported in large butts.

Currency, any medium of exchange by which the processes of trade are facilitated. Originally all exchanges may be supposed to have been made directly by barter, one commodity being exchanged against another according to the conveniences of the particular holders. In barter, however, it would obviously be often difficult to find two persons whose disposable goods suited each other's needs, and there would also arise difficulties in the way of estimating the terms of exchange between unlike things, and of subdividing many kinds of goods in the barter of objects of different value. To obviate these some special commodities in general esteem and demand would be chosen as a medium of exchange and common measure of value, the selection vary-ing with the conditions of social life. In the hunting state furs and skins have been employed by many nations; in the pastoral state sheep and cattle are the chief negotiable property. Articles of ornament, corn, nuts, olive oil, and other vegetable products, cotton cloth, straw mats, salt, cubes of gum, beeswax, etc., have all been at various times employed to facilitate exchange. These, however, while removing some of the difficulties attendant upon barter, would only partially solve others. It would be felt by degrees that any satisfactory medium must not only possess utility and value, but it must be portable, not easily destructible, homogeneous, readily divisible, stable in value, and cognizable without great difficulty. The metals would naturally commend themselves as best satisfying these requirements, and accordingly in all historic ages gold, silver, copper, tin, lead, and iron have been the most frequent materials of currency. The primitive method of circulating them appears to have consisted simply in buying and selling them against other commodities by a rough estimation of the weight or size of the portions of metal. Sometimes the metal was in its native state (e. g. rough copper or alluvial gold dust), at others in the form of bars or spikes, the first approximation to a coinage being probably rudely-shaped rings. The earliest money was stamped on one side only, and rather of the nature of stamped ingots than coins as we know them. The chief desiderata influencing the subsequent development of coinage were the prevention of counterfeiting, the prevention of any fraudulent subtraction of metal from the coin, the removal as far as possible of anything likely to occasion loss of metal in the wear and tear of usage, and the production of an artistic and historical monument of the state issuing the coin. Hence the elaboration of designs to cover the whole of a given portion of metal, and the nicer determination of quality, size, degree of relief, inscription, etc. While, however, metallic money of a guaranteed standard value was at an early period found to facilitate in a high degree the mechanism of exchange, it was speedily discovered that it was possible in large part to replace the standard gold, or silver, or copper coins by various forms of currency of a repre-sentative character. The standard money depended solely for its value in exchange upon the value of the material of which it was composed; its metallic value and its nominal value were coincident; the representative money derived its value from a theoretic convertibility at will into the standard coin. Thus in token coins the metallic value may be much less than the nominal value, which is defined by the fact that they can either by force of law, or custom be exchanged in a certain fixed ratio for standard coins. Gradually a series of devices came to be employed to further the interchange of commodities with the least friction and the least possible actual use of the coinage except as a standard and common denominator of value in terms of which exchanges were made. Even in home transactions, but especially in international transactions, the use of actual specie was found to involve a loss of interest and a risk of still more serious loss, and a paper currency based upon credit offered the readiest solution of the difficulty. In this way bank notes, bills of exchange, and checkswarrants or representative documents convertible, if desired, into standard coin-took their place alongside the metallic currency, partly displacing it, partly extending and supplementing it.

The requisites of circulation are that the monetary issues, whether of coin or paper, shall be from a recognized or official source, and that they admit of being freely returned when necessary, to the source from which they are issued. The certification of the fineness of the masses of metal circulating in a community, and the protection from adulteration and fraud, clearly falls among the neces-sary acts of police. It is still argued, as by Herbert Spencer in his Social Statics, that the coinage should be left to the ordinary competition of manufacturers and traders; but when this has occurred the currency has uniformly become debased, and it is generally held, in accordance with the maxims of civil and constitutional law, that the right of coining is a prerogative of the crown. Even in the case of state issues base money has been circulated. In the matter of state supervision two precautions are particularly necessary; that the standard coins shall be issued as nearly as possible of the standard weight, and that all coin worn below the least legal weight shall be withdrawn from circulation. The ground for these pre-cautions is to be found in the broad, general principle relating to the circulation of money. that bad money invariably drives good money out of circulation, the heaviest coins being selected for exporting, hoarding, melting, con-version into jewelry, gold leaf, etc. The law holds good not only with regard to coins in one kind of metal, but to all kind of money in the same circulation, the relatively cheaper me-dium of exchange being retained in circulation while the other disappears. Of the various systems of metallic currency, the first adopted was that known as the single-legal-tender system, in which the state issued certified coins in one metal only. It was found, however, that in such cases the people invariably circu-

## Currentometer

lated, for convenience, coins of other metals, and there naturally arose out of this the adoption of a double or multiple legal tender system, in which coins were issued in different metals at a fixed rate of exchange. To obviate difficulties arising from the possession of two or more metals as concurrent standards of value, with the constant tendency of one or other to become more valuable as metal than as currency, a third system, the composite-legal-tender, came into existence, in which coins of one metal were adopted as the standard of value, and token coins only issued in the other metals for the payment of small amounts. The double-legal-tender system is adhered to in the U.S.

The circulation of representative money differs from that of standard metallic money in that it only circulates within the district or country where it is legally or habitually cur-rent. In the payment of debts to foreign merchants the only money which can be exported is standard metallic money. Examples of this are to be found in the suspension of specie payments by the Bank of England between 1797 and 1819, and in the history of the French assignats at the time of the Revolution. The various methods on which the issue of paper money may be conducted are exceedingly numerous and a matter of interminable debate. The state may either constitute itself the sole issuer of representative money on the same lines as it constitutes itself the sole issuer of metallic money, or it may allow corporations, companies, or private individuals to issue representative money under legislative control.

The question as to the duty of a government in this respect has been much obscured by the want of a clear apprehension of the distinction between a real and a nominal currency. Another idea, that the issue of paper money ought to be wholly controlled by government, or ought to rest entirely upon government credit, places a high degree of faith in the trustworthiness of governments, and is held by many to misconceive the nature and objects of a paper currency.

**Currentom** eter (Current Gauge), an instrument for measuring the velocity of currents. It may be constructed in various ways, e. g., a simple tube which is bent and has its lower end open to the current, the ascension of water in the vertical part indicating the velocity of the current.

**Currents,** MARINE, masses of sea water flowing or moving forward in the manner of a great stream. They are phenomena of the highest importance, both on account of their influence upon the climate of many maritime regions—an influence often reaching far inland—and their practical relation to the art of navigation. These currents are very numerous, and taken together constitute an oceanic circulation the intricacy and irregularity of whose form is owing to the number and variety of the agencies at work. Among the theories which have been put forward to account for the existence of currents, the chief place belongs to the theory of a circuit maintained

## Currents

between equatorial and polar waters. According to this theory there is in either hemisphere an area within which the waters of the ocean are colder, and hence by many degrees denser, than within the belt of the tropics. The natural result is a tendency of the colder and heavier water to sink and to diffuse itself over the lower portion of the ocean bed, and a movement of the warmer and lighter water in the direction of the surface, over which it tends to become diffused. In other words, the colder waters will move beneath the surface in the direction of the equator, and the warmer waters will flow along the surface in the di-rection of either pole. Hence, in either half of the globe two great and opposite currentsa cold current flowing from the pole toward the equator, and a warm current flowing from the equator in the direction of the pole. This theory has been excellently illustrated by Dr. Carpenter's experiment, in which a trough of glass filled with water, and having a lump of ice at one end and a heated bar of iron at the other, exhibits a similar circulation of hot and cold currents. To this theory Sir C. Wyville Thomson opposed a theory of evaporation as the general cause of the movement, holding that in the Antarctic Ocean at least the return of moisture to the south to balance the cold indraught of water that comes from thence takes place in a large measure through the atmosphere. Another great general cause of currents is to be found in the axial rotation of the earth eastward, by which the movement of tropical waters toward the pole is deflected eastward, and becomes in the northern hemisphere a northeastwardly current and in the southern a southeastwardly one. Under the operation of the same laws the opposite currents from polar latitudes to the equator are deflected in southwesterly and northwesterly directions respectively. It is to such influences that we may in the main attribute the well-known differences between the climates of North America and Europe within correspondent parallels. Other causes, more local in their nature, must be looked for to explain the origin and direction of currents in particular cases. In the case of surface or drift currents, for instance, it is probable that these are largely caused by the action of winds. Thus it is to the constant drift of surface water to the westward under the influence of the tradewind that the equatorial currents of the Atlantic and Pacific are due. In the case of the Atlantic Ocean the westward-moving waters, encountering the eastward extension of the South American mainland, become of necessity divided into two streams, the one of which sets to the southward along the eastern coast of Brazil, while the other advances along the more northwardly portions of the South American continent, past the outlets of the Amazon and the Orinoco, and thence into the Caribbean Sea. From the latter land-enclosed basin its course is necessarily into the similarly shut in basin of the Mexican Gulf, whence it finally emerges through the narrow channel of Florida as the well-known Gulf Stream (which

see). In the case of the Pacific Ocean there exists no such unbroken land barrier to the westwardly progress of the equatorial waters. A portion of its equatorial stream, however, is deflected to the northward toward the coasts of Japan (where it forms the well-known Japan stream, setting to the northeastward, past the Kuriles, in the direction of the Aleutian Islands), while another portion turns southwardly in the direction of Australia and New Zealand. To the same action of the winds, operating in connection with the obstacles presented by the land, divergent and countercurrents are due. Thus in the Atlantic and the Pacific there flows between the two equatorial trade-wind currents a countercurrent in exactly the opposite direction, and there is a similar countercurrent in the Indian Ocean north of its sole trade-wind current. Currents called indraught currents are also caused by the flow of water to replace that taken away by currents due to causes already mentioned. An example of this is found on the west coast of Africa, where an indraught current replaces the water blown toward the coast of South America. In the case of inland seas evaporation determines the direction of the surface currents, the direction being inward, where, as in the Mediterranean, the evaporation exceeds the inflow of fresh water: and outward, as in the Baltic and the Black Sea, where there . is an opposite state of matters.

**Currying** is the art of dressing cowhides, calves' skins, sealskins, etc., principally for shoes, saddlery, or harness, after they have come from the tanner. In dressing leather for shoes the leather is first soaked in water until it is thoroughly wet; then the flesh side is shaved to a proper surface with a knife of peculiar construction, rectangular in form with two handles and a double edge. The leather is then thrown into the water again, scoured upon a stone till the white substance called bloom is forced out, then rubbed with a greasy substance and hung up to dry. When thoroughly dry it is grained with a toothed instrument on the flesh side and bruised on the grain or hair side for the purpose of softening the leather. A further process of paring and graining makes it ready for waxing or coloring, in which oil and lampblack are used on the flesh side. It is then sized, dried, and tallowed. In the process the leather is made smooth, lustrous, supple, and waterproof.

**Curso'res** (or Runner), an order of birds, which includes the ostrich, rhea, emu, cassowary, and apteryx. The birds of this order are distinguished by their remarkable velocity in running, the rudimentary character of their wings, which are too short to be of use for flight, and by the length and strength of their legs. The breast bone is destitute of the ridge or keel which it possesses in most birds, hence the name *Ratita* (*L. ratas*, a raft).

**Curtin,** ANDREW GREGG, b. in Bellefonte, Pa. April 22, 1815. He was elected governor of Pennsylvania in 1860. In 1863 he was reelected and in 1869 became minister to Russia. He sat in Congress from 1881 to 1887.

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**Curtis,** GEORGE TICKNOR, b. in Waterton, Mass., 1812; graduated at Harvard in 1832. Four years later he was admitted to the bar. He was a member of the state legislature from 1840 to 1844, and then became U. S. commissioner. He removed to New York City in 1862. His writings on commercial and copyright law are very numerous.

**Curtis,** GEORGE WILLIAM (1824-1802), American author, b. in Providence, R. I.; in 1830 he joined the staff of the New York Tribune, and was one of the editors of *Putnam's* Monthly from 1852 to 1869. He commenced the "Editor's Easy Chair" papers in Harper's Monthly in 1853, and became principal leaderwriter for Harper's Weekly on its establishment in 1857. A novel, Trumps (1862), and most of his books appeared first in these journals. Until 1884 he was one of the most prominent and influential members of the Republican party.

Cu'rule Magistrates, in ancient Rome, the highest dignitaries of the state, distinguished from all others by enjoying the privilege of sitting on ivory chairs when engaged in their public functions. The curule magistrates were the consuls, prætors, censors, and chief ædiles, who, to distinguish them from the plebeian ædiles, were called curule.

**Cusco-bark** (Cuzco-bark), the bark of *Cinchōna pubescens*, which comes from Cuzco, in South America, and is exported from Arequipa. It contains a peculiar alkaloid called cuscocinchonine, or cusconine, which resembles cinchonine in its physical qualities, but differs from it in its chemical properties. When applied medicinally it excites warmth in the system, and is therefore recommended to be given in cold intermittents and low typhoid states of the system.

**Cuscus**, a genus of animals of the phalanger family, somewhat resembling the opossums, having a dense woolly fur, prehensile tails, and living on leaves; natives of the smaller Australian islands.

Cushing, CALEB (1800-1879), statesman, b. in Salisbury, Mass. After graduating at Har-vard in 1817, he was tutor of mathematics and natural philosophy there until 1819, was ad-mitted to the bar in 1822. In 1825-26 he served in the legislature. He was elected to Congress in 1835, serving until 1843. He was nominated by Tyler for secretary of the treasury, but was rejected by the senate. In 1843 he was made U.S. commissioner to China and negotiated a treaty which was ratified in 1845. He was elected to the legislature in 1846. In 1850 he was re-elected, and was made the first mayor of Newburyport. In 1852 he was appointed an associate justice of the Supreme Court of Massachusetts, and in 1853 was made U.S. attorney-general. In 1866 was appointed with two other jurists to revise and codify the laws of the U.S. In 1868 he was sent to the U.S. of Colombia, South America, on a diplomatic errand, and in 1870 engaged in preparing the protocol of the Treaty of Washington and afterward in the statement to be laid before the tribunal of arbitration in Geneva. In 1873

he was nominated as chief justice of the U.S. but was not confirmed by the senate, and in the same year he was made minister to Spain. In 1852 Harvard gave him the degree of LL.D. He was the author of *Reminiacences of Spain*, The Country, Its People, History, and Monuments; and Historical and Political Review of the Late Revolution in France. His wife published Letters Descriptive of Public Monuments, Scenery, and Manners in France and Spain.

**Cushion Capital**, a capital which has the appearance of a cushion pressed upon by the weight of its entablature, or, like the Norman capital, consisting of a cube rounded off at its lower extremities.

**Cushman**, CHARLOTTE S. (1816-1876), actress, was b. in Boston. She made her first appearance in opera in the Tremont Theater. As an actress she first appeared as Lady Macbeth in 1835. She was powerful in tragedy, great in Shakespearian characters. As a dramatic reader she developed remarkable ability.

**Cushman**, PAULINE, spy, born in New Orleans, La., 1833. At first she was a variety actress. When the war began she was employed by the U. S. government as a detective of Southern sympathizers in Louisville, Ky. For some time she posed in the Southern states as a Confederate sympathizer, but remained steadfast to her affiliations with the national government. Eventually she was captured as a Northern spy, court-martialed, and sentenced to be hanged. But when the Confederates left Shelbyville she was left behind, and became released by entrance of the Union army.

**Cusso**, a small Abyssinian tree, order Rosaceæ, yielding flowers which are imported into Europe and used as an anthelmintic.

**Custis**, GEORGE WASHINGTON PARKE (1781-1857), author, b. in Md. In early life he was married to Mary Lee Fitzhugh. He became a fluent speaker, wrote plays for his amusement, and finished several paintings of battles of the Revolution. He published *Recollections* of Washington.

Custer, GEN. GEORGE ARMSTRONG (1839-1876), soldier, b. in New Rumley, O. Graduated from U. S. Military Academy, 1861. He was sent from Washington with dispatches to General McDowell and took part in the first battle of Bull Run. Gen. Geo. B. McClellan was so impressed by his energy and bravery that he appointed him aid-de-camp. Captain Custer took the first colors captured by the Union army. June 29, 1863, he was appointed brigadier general of volunteers. He gained the rank of major, July 3, 1863. For gallantry at the battle of Winchester he was made brevet colonel, Sept. 19, 1864, and October 19 he was made major general of volunteers. He was made brigadier general, May 13, 1865. He served on the plains from 1866-1871. June, 1876, General Custer with his whole command was defeated and slain on the Little Big Horn (in a region almost unknown), by the confederate Sioux. The spot has become a national cemetery.

**Customhouse** is the house or office where

#### Customhouse

vessels are entered and cleared, and where the proper customs or duties are paid.

The system of customs duties is as old as the Roman Empire, and it is even claimed that it existed in ancient Greece. It was a feature of the Venetian government in medieval days, and the customhouse of Venice had its name wrought in nails upon its great swinging door. The noted "Zollverein" was a tariff union of North German sovereignties which existed from 1818 until it was merged into the German Empire after the Franco-Prussian War. In England, while there was no doubt that customs duties were collected prior to the Norman Conquest, their more modern use dates from the long conflict between the tion. To meet the claims made by the House of Commons to the exclusive right to vote all supplies, it used to be maintained that there were certain duties on exportation and importation to which the crown had acquired a right by custom; and the name thus acquired was retained after the power claimed by the lower branch of Parliament had been settled by permanent legislation. The first customhouse was erected in London in 1304.

Upon the organization of our government after the close of the Revolution, the system of customs duties then in operation in England was adopted with scarcely any modification, under the direction of Alexander Hamilton, the first secretary of the treasury. Among the especial features of the system was that of debentures, or drawbacks, which were certificates entitling an exporter of imported goods to a drawback of duties paid on their importation, and also to re-export them to foreign ports. Subsequently the object thereby accomplished was more directly facilitated by permitting the importer to "bond" his goods in government warehouses until he was able to pay the duties; and later on the practise was modified still more in favor of the importer by permitting him to take out of "bond" from time to time portions of the invoice of goods consigned to him, paying the proportionate amount of duties. This system of bonded warehouses, which is now a feature of the customs service in every civilized country of the world, was embodied in an act of Congress passed in 1840, during the incumbency of the treasury department by Robert J. Walker, and known as the Walker act. It is a peculiar fact that in the colossal bonded warehouses of Hamburg, Germany, vast quantities of American whisky lie in bond, while other holders of this species of goods send it, in bond, "round the Horn" to the Pacific Coast and back, the sea voyage improving the quality of the spirits. Under our present method a credit of three years is given to importers who desire to keep their goods in bond. Realizing the immense amount of our customs system, the early secretaries of the treasury, and especially Alexander Hamilton, Albert Gallatin, Wm. H. Crawford, Richard Rush, Levi Woodbury, and Thomas Corwin, united in a policy favorable to the importer, and in

that way materially contributed to build up our commerce to the commanding position it now enjoys.

The first customhouse was established in New York City in 1799 under an act of Congress passed the previous year, and the net revenue received by the government from customs duties in the first year was so small that it is related that the collector, who with his family lived over the custom house, used the receipts of his office to pay the men employed by him. At the present time the number of customhouses in the U.S. is 152. The ten which render the largest returns to the government are, in their order, New York, Boston, Philadelphia, San Francisco, Chicago, Baltimore, New Orleans, St. Louis, Detroit, and Tampa, Florida. The amounts of net revenue received by the government through these customhouses for the year 1896 are as follows:

New York	\$109,326,145.72
Boston	11,219,468.91
Philadelphia	13,109,655.12
San Francisco	5,526,535.34
Chicago	5,471,003.89
Baltimore	2,825,586.39
New Orleans	1,719,815.75
St. Louis	1,129,966.06
Detroit	792,535.36
Tampa, Fla	784,693.07

The customhouse in Tampa was established by an act of Congress Feb. 28, 1887, since which she has outstripped many of the leading cities of the country.

The net revenues received by the government through the customhouses of the country since the organization of the revenue system, are by decades as follows:

From	1791	to	1800	.\$	50,321,485.87
**	1801	to	1810		129,540,517.63
4.4	1811	to	1820		163,804,167.09
• •	1821	to	1830		198,523,207.69
44	1831	to	1840		204,703,913.92
44	1841	to	1850		243,666,681.78
* *	1851	to	1860		544,980,470.30
4.4	1861	to	1870		1,239,458,442.34
* *	1871	to	1880		1,663,973,043.74
"	1881	to	1890		1,992,600,748.76
**	1891	to	1896	•	1,059,116,311.87

Total.....\$7,390,688,990.99

NOTE.—In accordance with an act passed by Congress in 1842, the fiscal year since that time has begun on the first of July. Therefore the decade from 1841 to 1851 in the above list, embraces only nine and a half years.

**Cutch**, a state in the west of India, lying to the south of Sind, under British protection; area 6,500 sq. mi. During the rainy season it is wholly insulated by water, the vast salt morass of the Rann separating it on the north and east from Sind and the Guicowar's Dominions. Its southern side is formed by the Gulf of Cutch, and on the west it has the Arabian Sea. The country is subject to violent volcanic action. The date is the only fruit which thrives, and the principal exports are cotton and horses. Pop. 512,084.

**Cutch Gunda** va, a division of Beloochistan, in the northeast; area 10,000 sq. mi.; pop. 100,000.

Cutlery, a term applied to all cutting instruments made of steel. The finer articles, such as the best scissors, penknives, razors, and lancets are made of cast steel. Table knives, plane irons, and chisels of a very superior kind are made of shear steel, while common steel is wrought up into ordinary cutlery. One of the commonest articles of cutlery, a common razor, is made as follows: The workman, being furnished with a bar of cast steel, forges his blade from it. After being brought into true shape by filing, the blade is exposed to a cherry-red heat, and instantly quenched in cold water. The blade is then tempered by first brightening one side and then heating it over a fire free from flame and smoke, until the bright surface acquires a straw color (or it may be tempered differently). It is again quenched, and is then ready for being ground and polished.

**Cuttack**, a town of Hindustan, in Orissa, 230 mi. s.s.w. Calcutta. It is known mainly for its beautiful filigree work in gold and silver. Pop. 51,000. The district of Cuttack has an area of 3,517 sq. mi. It is well watered, and rice, pulse, sugar, spices, dye stuffs, etc., are grown along the coast, which is low and marshy, and wheat and maize in the hilly regions. On the coast salt is extensively manufactured. Pop. 1,738,165.

**Cutter**, a small vessel, furnished with one mast, and a straight running bowsprit which



may be run in upon deck. It differs from the sloop in having no stay to support its jib.

Cûvler (küv-yā), GEOROES LÉOPOLD ÜHRÉTIEN FRÉDÉRIC DAGOBERT, BARON (1769-1832), a distinguished modern naturalist, was b. at Montbéliard, then belonging to the duchy of Würtemberg. His lectures on natural history, distinguished not less for the elegance of their style than for profound knowledge and elevated speculation, were attended by all the accomplished society of Paris. In January, 1800, he was appointed to the Collége de France. Under Napoleon, who fully recognized his merits, Cuvier held important offices in the department of public instruction. In 1819 he was received among the forty members of the French Academy.

Cuzco, an ancient city in Peru, capital of a department of the same name, is situated in a wide valley about 11,300 ft. above sea level, between the Apurimac and Urubamba. The ruins of the fortress built by the Incas, a stupendous specimen of cyclopean architecture, are still to be seen, as well as other massive specimens of ancient Peruvian architecture. The inhabitants manufacture sugar, soap, cotton, woolen goods, etc. There is a university, a cathedral, etc. Cuzco is the most ancient of the Peruvian cities, and was at one time the capital of the empire of the Incas. In 1534 it was taken by Pizarro. Pop. 18,730. Area of the department 95,547 sq. mi.; pop. 238,445.

Cy'anite (or Kyanite), a mineral of the garnet family found both massive and in regular crystals. Its prevailing color is blue, but of varying shades. Found only in primitive rocks.

Cyan' ogen, a compound radical composed of one atom of carbon and one of nitrogen. It is a gas of a strong and peculiar odor, re-sembling that of crushed peach leaves, and burning with a rich purple flame. It is unrespirable and highly poisonous. It unites with oxygen, hydrogen, and most non-metallic elements, and also with the metals, forming cyanides. Combined with hydrogen it forms prussic acid.

Cyanom'eter ("measurer of blue") is the name of an instrument invented by Saussure for ascertaining the intensity of color in the sky. It consists of a circular piece of metal or pasteboard, with a band divided by radii into fifty-one portions, each of which is painted with a shade of blue, beginning with the deepest, not distinguishable from black, and decreasing gradually to the lightest, not distin-guishable from white. The observer holds this up between himself and the sky, turning it gradually round till he finds the tint of the instrument exactly corresponding to the tint of the sky.

**Cyan'otype Process**, a photographic pic-re obtained by the use of a cyanide. This ture obtained by the use of a cyanide. process is in very common use by architects and engineers for copying plans, producing an image with white lines upon a blue ground. Sensitive paper is made by brushing it over with a solution of ferric oxalate; it is then exposed under the positive and treated with a solution of potassium ferricyanide, by which the image is developed. The color of the ground is deepened by subsequent washing with solution of potassium bisulphate.

Cybele (sib'o-lē), originally a goddess of the Phrygians, like Isis, the symbol of the moon, latterly introduced among the Greeks and Ro-Her worship was celebrated with a viomans. lent noise of instruments and rambling through fields and woods, and her priests were eunuchs in memory of Atys.

## Cyclometer

Cycada'ceæ (or Cycads), a nat. order of gymnospermous plants, resembling palms in their general appearance, and, as a rule, increasing by a single terminal bud. The leaves are large and pinnate, and usually rolled up when in bud like a crozier. The microscopic structure of the wood, as well as the general structure of their cones, allies them with the confers.

Cycladés (sik'la-dēz) (or kyklades), the principal group of islands in the Grecian Archipelago now belonging to the kingdom of Greece, so named from lying round the sacred island of Delos in a circle. The largest islands of the group are Andros, Paros, Myconos, Tenos, Naxos, Melos, and Thera or Santorin. They are of volcanic formation and generally mountainous. Some are very fertile, producing wine. olive oil, and silk; others almost sterile. The inhabitants are excellent sailors. Pop. 132,020.

Cycling. See *Bicycle*. Cycloid Fishes, an order of fishes according to the arrangement of Agassiz, having smooth, round, or oval scales, as the salmon and her-ring. The scales are formed of concentric layers, not covered with enamel and not spinous on the margins; they are generally imbricated. but are sometimes placed side by side without

overlapping. Cyclom'eter, a machine attached to a wheel. especially to that of the bicycle, to measure and record the distance traveled. This machine is a modification of and an improvement upon the odometer, which is known to have been used in the time of the Emperor Commodus. It is spoken of by Capitolinus in his Life of the Emperor Pertinax; also carvings of this instrument were made on the ducal palace of Urbino in the fifteenth century. Distances were measured in France by this instrument in 1550, and descriptions of this machine appeared in 1604 and 1612. An English artist, named Butterfield, invented an odometer at the end of the seventeenth century, and various improve-ments were made in France and other countries during the eighteenth century. Among the oldest inventions patented in the U.S. is an odometer (or road measurer), cyclometer for use on a coach. This was invented by W. A. Turner and patented in 1833. The registering mechanism was similar to that used to-day on gas meters, and it was placed in the body of the coach and operated from the wheel through a series of shafts, wheels, and universal joints. Since that time about two hundred patents have been granted in the U.S. for odometers or cyclometers. Most of them have been similar to Turner's but placed near the wheels and operated direct. Others have been operated by electricity, which necessitated carrying a bat-With the revival of the bicycle the name tery. was changed from odometer to cyclometer. and numerous new designs were brought out. Among the best of these was Stanton's bicycle log, an English instrument which was clamped to the axle of the front wheel and operated by a weight on the inside. The next step was to allow the cyclometer to hang loosely on the axle and operate it by the latter by means of a

worm wheel or pin. The Ritchie cyclometer was operated by a magnet which revolved with the axle and moved a small needle within the This allowed the case to be hermetically case. sealed against dust and oil and yet avoided the uncertain action due to jarring and centrifugal force of a weight. The Hoyt cyclometer, 1886, was attached to the under side of the pedal and operated by a cam attached to the crank. About 1890 shortly after the advent of the modern safety bicycle, the cyclometers were attached to the front fork and operated by a pin or projection attached to the wheel. The dials resembled a watch, the distance being designated by hands or by figures appearing through small openings on the dial. With these instruments the figures occupied only a small part of the space taken up by the dial so that the latter was larger and projected farther from the bicycle than necessary and was frequently broken. In 1895 the form was changed from a round dial to a cylinder or barrel. This form is light, compact, while the figures are large and easily read and has proved to be very popular. Accuracy is an important point in any measuring instrument, but when a soft or yielding tire is used it becomes impossible to register the distance traveled with absolute accuracy. The number of revolutions of the wheel in going a mile will be more or less as the tire is soft or hard, this being especially the case with pneumatic tires. For instance the front wheel of a standard bicycle is 28 in. in diameter, and if the tire were incompressible would revolve 720 times in going one mile. Ĩf the tire is very soft and compresses ‡ in., that is, if the diameter is equivalent to 274 in., it will revolve 733 times per mile. Some cyclometers, for standard sized wheels, register a mile for every 728 revolutions which corresponds to a compression of about 3 in., which seems to be a fair average. The wheel will then advance 87 in. in one revolution and may be tested as follows: Place the bicycle on a smooth floor with a rider in the saddle; mark the tire and the floor under the center of the wheel; then carefully push the bicycle ahead in a straight line until the mark on the tire again comes under the center of the wheel; mark the floor again opposite the mark on the tire. If the distance between the two marks on the floor is 87 in., the cyclometer will register correctly.

The manufacture of cyclometers requires the best material, the finest machinery, and as much care as a watch. One of the largest factories in the U.S. employs 140 people on this work exclusively. Most of these are women.

**Cyclone** (sī'klon), a circular or rotatory storm or system of winds, varying from 50 to 500 mi. in diameter, revolving round a center, which advances at a rate that may be as high as 40 mi. an hour, and toward which the winds tend. Cyclones of greatest violence occur within the tropics, and they revolve in opposite directions in the two hemispheres—in the southern with, and in the northern against, the hands of a watch — in consequence of which, and the progression of the center, the strength of the storm in the northern hemisphere is greater on the south of the line of progression and smaller on the north, than it would be if the center were stationary, the case being reversed in the southern hemisphere. An *anticyclone* is a storm of opposite character, the general tendency of the winds in it being away from the center, while it also shifts within comparatively small limits. Cyclones are preceded by a singular calm and a great fall of the barometer.

**Cyclo' plan Works,** in ancient architecture, masonry constructed with huge blocks of stone unhewn and uncemented, found in Greece, Sicily, Asia Minor, etc.

**Cy** clops, in Greek myths, a fabled race of one-eyed giants, the sons of Urănus and Gē (Heaven and Earth), slain by Apollo. They were often represented as a numerous race living in Sicily and rearing cattle and sheep. Of such is the Cyclops of the Odyssey. Later traditions describe them as the servants of Vulcan working under Ætna, and engaged in forging armor and thunder bolts. Cyclops is likewise the generic name of a certain minute Crustacean, order Branchiopoda, having but one eye, situated in the middle of its forehead.

**Cydnus** (sid'nus), a river in Cilicia, rising in the Taurus Mountains, anciently celebrated for the clearness and coolness of its waters.

**Cyl'Inder**, a geometrical solid which, in popular language, may be described as a long, round, solid body, terminating in two flat, circular surfaces which are equal and parallel. In steam engines, the cylinder is the chamber in which the force of the steam is exerted on the piston.

**Cylin' drical Lens**, a lens whose surfaces are cylindrical, instead of spherical, which is usually the case. A convex cylindrical lens brings the image of a source of light to a focus in a line instead of in a point. They are usually cylindrical on one side and flat on the other.

Cy'ma, in architecture, a wavy molding the profile of which is made up of a curve of contrary flexure, either concave at top and convex at bottom or the reverse.

**Cyme** (sim), in botany, a mode of inflorescence in which the principal axis terminates in a flower, and a number of secondary axes rise from the primary, each of these terminating in a flower, while from these secondary axes others may arise terminating in the same way, and soon giving a flat-topped or rounded mass.

**Cymrl** (kim ri), a branch of the Celtic family of nations which appears to have succeeded the Gaels in the great migration of the Celts westward, and to have driven the Gaelic branch to the west (into Ireland and the Isle of Man) and to the north (into the Highlands of Scotland), while they themselves occupied the southern parts of Britain. At a later period they were themselves driven out of the Lowlands of Britain by the invasions of the Angles, Saxons, and Jutes, and compelled to take refuge in the mountainous regions of Wales, Cornwall, and the northwest of England. Wales may now be regarded as the chief seat of the Cymri. **Cynewulf** (kin'e-wulf), an Anglo-Saxon or early English poet, whose name we only know from its being given in runes in the poems attributed to him.

**Cynics** (sin'iks), a sect of philosophers among the ancient Greeks, founded by Antisthenes, a scholar of Socrates, at Athens, about 380 B.c. Their philosophy was a one-sided development of the Socratic teaching by Antisthenes and his followers, who looked only to the severer aspect of their master's doctrines, and valued themselves on their contempt of arts, sciences, riches, and all the social civilization of life.

Cy'nips, the gall-fly, a genus of hymenopterous insects remarkable for their extremely minute head and large, elevated thorax. The females are provided with an ovipositor by which they make holes where they deposit their eggs in different parts of plants, thus producing those excressences which are known as galls.

**Cynosceph'aise** ("dogs' heads"), a range of hills in Thessaly, memorable for two battles fought there in ancient times. The first was B.C. 364, between the Thebans and Alexander of Pheræ, and the second B.C. 197, in which the last Philip of Macedon was defeated by the Roman consul Flaminius.

Cy'press, a genus of coniferous trees. The common European cypress is a dark-colored evergreen with extremely small leaves, entirely covering the branches. It has a quadrangular, or, where the top branches diminish in length, pyramidal shape. Cypress trees, though of a somewhat somber and gloomy appearance, may be used with great effect in shrubberies and gardens. They are much valued also on account of their wood, which is hard, compact, and very durable, of a reddish color and a pleasant smell. It was used at funerals and as an emblem of mourning by the ancients. Its timber is valuable, and under water is almost imperishable. In parts of the U.S. this cypress constitutes forests hundreds of miles in extent.

**Cypripe' dium** (Lady's Slipper), a genus of plants of the nat. order Orchidaceæ. These species are natives of the U. S.

**Cyp'ris, a** genus of minute fresh-water crustaceans popularly known as water fleas. They have the body enclosed in a delicate shell and swim by means of cilia. The Cypris is common in stagnant pools, and is very often found in a fossil state.

Cy prus, an island lying on the south of Asia Minor, and the most easterly in the Mediterranean. Its greatest length is 145 mi. maximum breadth about 60 mi.; area 3,678 sq. mi. The chief features of its surface are two mountain ranges, both stretching east and west, the one running close to the northern shore, and extending through the long northeastern horn or prolongation of the island; the other and more massive occupying a great part of the south of the island, and rising in Troödos to 6,590 feet. Between them is the bare and mostly uncultivated plain called Messaria. There is a deficiency of water. The climate is in general healthy. The mountains are

covered with forests of excellent timber (now under government supervision), and the island is esteemed one of the richest and most fertile in the Levant. Agriculture, however, is in a very backward state, and locusts sometimes cause great damage. Wheat, barley, cotton, tobacco, olives, raisins, and carobs are the most important vegetable products. The wine is famous, especially that known as com-Silkworms are reared, and a coarse mandery. kind of silk is woven. Salt in large quantities is produced. The minerals are valuable: the copper mines were of great importance in ancient times (the name copper is derived from that of this island), and are again being worked. Large numbers of sheep and goats are reared on the extensive pasture lands of the island. The principal towns are Lefkosia or Nicosia. the capital, the only considerable inland town, and the scaports Larnaca and Limassol. The chief exports are carobs, wine, and cotton, with cheese, raisins, cocoons, wool, etc.

After belonging successively to the Phonicians, Greeks, Egypt. Persia, and again to Egypt, Cyprus in 57 B.C. became a Roman province, and passed as such to the eastern division of the empire. In 1191 it was bestowed by Richard of England (who had conquered it when engaged in the third Crusade) on Guy de Lusignan, and after his line was extinct it fell into the hands of the Venetians (1489), with whom it remained till it was conquered by the Turks in 1571 and annexed to the Ottoman Empire. In 1878 it was ceded to Britain by the convention of Constantinople concluded between England and Turkey, its reversion to Turkey being provided if Russia should give up Batoum and Kars. Britain was also bound to pay a subsidy to Turkey annually amounting to about \$465,000, but this is not paid directly, being retained as an offset against British claims on Turkey. The island has be come much more prosperous under British administration, and roads, harbor works, etc., have been constructed, trees planted, and schools opened. The head of the government is the chief commissioner, and there is a legislative council of twelve elected and six official members, nine of the former being Greeks, the others Mohammedans. Pop. 186,000, of whom three fourths belong to the Greek Church.

**Cyr** (sēr). ST., a French village in the department of the Seine-and-Oise, famous for the seminary for the education of ladies of rank which Louis XIV founded here. During the revolution this institution was done away with, and the buildings finally converted into a military school by Napoleon (1803). Pop. of the commune, 2,870.

**Cyrenaica** (si-re-nā'i-ka), once a powerful Greek state in the north of Africa (corresponding partly with the modern Barca), west of Egypt, comprising five cities (Pentapolist among which was Cyrene, a Spartan colony, founded in 631 B.C. Latterly it came into the hands of the Ptolemies, and in B.C. 95 the Romans obtained it. The Arab invasion ruined it (647). Cyrenaica is at present a vast but as yet imperfectly explored field of antiquities. **Cyrene** (si- $r\bar{e}$ ' $n\bar{e}$ ), in ancient times a celebrated city in Africa, about 10 mi. from the north coast, founded by Battus, and a body of Dorian colonists. B. C. 631. Numerous interesting remains have been discovered here. The town now occupying the site of the ancient Cyrene is a miserable place in the vilayet of Barca.

**Cyrillian Letters,** characters used in one of the modes of writing the Slavonic language. In Poland, Bohemia, and Lusatia, Roman or German letters are used; but among Russians, Bulgars, and all the Slavonic nations belonging to the Greek Church, the Cyrillic alphabet, a modification of the Greek one, is in use. Besides these there is the Glagolitic alphabet, in which the oldest literature of the Slavonic church is written.

Cy'rus, king of Persia, a celebrated conqueror. According to Herodotus he was the son of Cambyses, a distinguished Persian, and of Mandane, daughter of the Median king Astyages. His grandfather, made apprehensive by a prophecy that his grandson was to dethrone him, gave orders that Cyrus should be destroyed after his birth. But the boy was preserved by the kindness of a herdsman, and at length sent to his parents in Persia. Here Cyrus soon gathered a formidable army, conquered his grandfather (B. c. 559), and thus became king of Media and Persia. He was slain in battle with a Scythian nation in B. c. 529.

**Cyrus**, called the *Younger*, to distinguish him from Cyrus the founder of the Medo-Persian monarchy, was the second son of Darius Nothus or Ochus. Having formed a conspiracy against his elder brother, Artaxerxes Mnemon, Cyrus was condemned to death, but released at the request of his mother, Parysates, and made governor of Asia Minor. Here he secretly gathered an army, an important part of which consisted in 13,000 Greek auxiliaries, and marched eastward. His brother with a large army met him in the plains of Cunaxa (B.C. 401), and in the battle which followed, although the troops of Cyrus were victorious, Cyrus himself was slain.

## Czernowitz

**Cystop'teris,** bladder fern, a genus of polypodiaceous delicate flaccid ferns.

Cyt'isus, a genus of plants belonging to the natural order Leguminosæ, sub-order Papilionaceæ. The members of the genus are shrubs or small trees, sometimes spiny, with leaves composed of three leaflets, and with yellow, purple, or white flowers. They belong to Europe. Asia, and North Africa, and are very ornamental plants.

**Cyz'icus**, a peninsula of Asia Minor, 60 mi. s.w. of Constantinople. It was once an island, and the site of an ancient town of the same name.

**Czar** (zür or tsör), a title of the Autocrat of all the Russias, not improbably a corruption of the Roman title Cæsar. It was first adopted in 1579 by Ivan II. The feminine of czar is *czarina*, meaning the empress of Russia.

**Czechs** (chols), the most westerly branch of the great Slavonic family of races. The Czechs have their headquarters in Bohemia, where they arrived in the fifth century. The origin of the name is unknown. The total number of the Czechs is about 6,000,000, nearly all of whom live in the Austrian Empire. The Czechs proper, in Bohemia, number about 2,700,000. They speak a Slavonic dialect of great antiquity and of high scientific cultiva-The Czech language is distinguished as tion. highly inflectional, with great facility for forming derivatives, frequentatives, inceptives, and diminutives of all kinds. Like the Greek it has a dual number, and its manifold declensions, tenses, and participial formations, with their subtle shades of distinction, give the language a complex grammatical structure. The alphabet consists of forty-two letters, expressing a great variety of sounds. In musical value the Czech comes next to Italian.

**Czegled** (tseg'lād), a market town, Hungary, 39 mi. s. e. of Budapest, in a district yielding grain and wine. Pop. 24,872.

**Czernowitz** (cher-nö'vits), a city of Austria, chief town of Bukowina, 138 mi. s. e. of Lemberg. It has manufactures of clocks, silverplate, carriages, toys, etc. Pop. 45,600, a considerable proportion being Jews.

**D**, the fourth letter in the alphabet, representing a dental sound formed by placing the tip of the tongue against the root of the upper teeth, and then forcing up vocalized breath, or voice, into the mouth, the soft palate being raised to prevent its escape through the nose. T is formed in the same way, except that it is uttered with breath merely and not with voice. As a numeral, D represents 500.

**Dab**, a fish belonging to the family of flatfishes, comprising also the soles, turbots, halibuts, plaice, and flounder, the last two being included in the same genus with the dab. It is of a pale brownish color spotted with white on the side which it usually keeps uppermost, and



Dab.

white on the underside, and has rougher scales than the other members of the same genus. It is preferred to the flounder for the table.

**Dacca**, a district of Hindustan in Bengal, at the head of the Bay of Bengal: area, 2,797 sq. mi. It is one of the richest districts in India, and produces such quantities of rice as to be called the granary of Bengal. Dacca was at one time celebrated for its hand-woven muslins, which are still hardly to be equaled in their combination of durability and delicacy. Dacca, its capital, is about 150 mi. n.e. of Calcutta. Dacca, being free from violent heats, is one of the healthiest stations in Bengal. Pop. 82,321.

**Dace**, a small river fish of the family Cyprinidæ, and resembling the roach but longer and thinner. It is a gregarious fish swimming



Dace.

in shoals and inhabiting chiefly deep, clear streams with a gentle current. It seldom exceeds a pound in weight.

Da'cla, in ancient times, a region north of the Danube, inhabited by the Daci, or Getæ, afterward a Roman province. It was con-

## Daguerreotype Process

quered by the emperor Trajan in 101 A.D., but in 274 A.D., in the reign of Aurelian, had to be abandoned by the Roman colonists.

**Da'do**, in classical architecture, the middle part of a pedestal, that is to say, the solid rectangular part between the plinth and the cornice; also called the *die*. In the interior of houses it is applied to a skirting of wood several feet high round the lower part of the walls. or an imitation of this by paper or painting.

or an imitation of this by paper or painting. Dæ'dalus, a mythical Greek sculptor, the scene of most of whose labors is placed in Crete. He is said to have lived three years before the Trojan War. He built the famous labyrinth in Crete.

**Daff'odil**, the popular name of a European plant which is one of the earliest ornaments of gardens, being a favorite object of cultivation.

**Daghestan**, a province of Russia, in the Caucasus. Area 11,332 sq. mi.; pop. 609,380. Its fertile and tolerably cultivated valleys produce good crops of grain. and also silk, cotton, flax, tobacco, etc.; capital, Derbend.

Dag' obert 1 (600-638), surnamed the Great, one of the Merwing kings of France. He succeeded his father, Hhlotar II. in 628; warred successfully against Gascons, Bretons, Saxons, and Slavonians; reformed the Frankish laws: d. at Epinay, and was buried at St. Denis. He was an able but a cruel and licentious king.

Da'gon (probably from the Hebrew dag, a fish), the god of the Philistines, whose image is generally believed to have been in the form of a triton, or merman, with the upper part human and the extremities, from the waist downward, in the shape of the tail of a fish.

**Daguerre** (dä-går), LOUIS JACQUES MANDE (1789-1851), the inventor of the first photographic process. He was a scene-painter at Paris, and as early as 1814 had his attention directed by Nicéphore Niepce to the subject of photographic pictures on metal. In 1829 they made a formal agreement to work out the invention together, but it was not till after 1833, that Daguerre succeeded in perfecting the process since called *daguerreotype*. The new process excited the greatest interest. Daguerre was made an officer of the Legion of Honor, and an annuity of 6,000 francs was settled on him.

Daguerreotype Process (dager'ro-tip), the original photographic process, consisting in sensitizing a silver plate with the vapor of iodine, and then placing it in a camera obscura previously focused, and afterward developing the picture by vapor of mercury. It is then fixed by immersion in hyposulphate of sodium. After thorough washing and drying the picture is covered with glass to prevent its being rubbed off. Daguerreotype has now been superseded by the collodion and other processes.

## Dahlgren

Dahlgren, JOHN ADOLPH (1809-1870), American naval officer and artillerist; he entered the navy in 1826, passed midshipman in 1832, and afterward served in the coast survey. In 1843 he went to the Mediterranean on a cruise. On his return, in 1845, he was assigned to ordnance duty in Washington. In 1857 he equipped the *Plymouth*, and visited the coast of Europe from Portugal to Holland. Subsequently he cruised in the West Indies, and on his return to Washington, resumed command of the ordnance department, of which he was made chief in July, 1862. At the beginning of the Civil War he had charge of the defenses of Washington on the left, and in 1863, he was made rear admiral, and was placed in command of the South Atlantic blockading squadron. In 1866 he had command of the South Pacific squadron, and in 1868 again took charge of the bureau of ordnance in Washington. ľn 1869 he was appointed commandant of the Washington navy yard. His works on ordnance have been used as text-books by the government.

**Dahlgren** (däl'gren) **Guns**, an improved kind of cannon invented by Admiral Dahlgren of the U. S. navy. The chief peculiarity consists in their having less metal between the muzzle and the trunnions than ordinary cannon.

Dah'lia (so called after the Swedish botanist Dahl), a genus of plants belonging to the nat. order Compositæ, sub-order Corymbiferæ,



Dahlia. A.-single; B.-double varieties.

natives of Mexico. By cultivation an immense number of varieties have been produced. The flowers are large and beautiful, sporting into innumerable varieties. It does not stand frost, and has to be taken up during winter.

**Dahlmann** (däl-mån), FRIEDRICH CHRISTOPH, (1784-1860), a distinguished historian of Germany. He was professor at Göttingen and

#### Dalbergia

afterward at Bonn, and distinguished himself as an advocate of liberal measures in politics.

Daho' mey, a kingdom of West Africa; area 3,960 sq. mi.; pop. 250,000. The country yields cotton, sugar, tobacco, indigo, palmoil, ivory, india-rubber, yams, melons, oranges, limes, pineapples, and other fruits, and beans, peas, maize, millet, and Guinea-corn in abundance. A plentiful supply of cattle is to be found over all the country. Wild animals are numerous, including the lion, tiger, elephant, hyena, the boa, and other reptiles. The inhabitants are a tall, well-made, and warlike, but savage race, of pure negro blood, belonging to a branch of the Ewe family, partly employed in agriculture, and practising a rude form of fetish-worship made up of ridiculous ceremonials and extensive human sacrifices. All the females in the state belong nominally to the king, and at a grand yearly festival there is a general distribution of wives. The only considerable town is Abomey, or Agbome, the capital, situated 95 mi. inland from its small port of Whydah. It is surrounded by mud-built walls and by a ditch four miles in circumference, but only contains some 20,000 inhabitants. In October, 1885, at the request of the king, Dahomey was placed under the protectorate of Portugal. In 1890 King Benhawzin and the French fell out about Porto Novo and Kotonu, which the latter claimed. A short war resulted in the submission of the king, who agreed to waive all claim to the territory in question on the receipt of an annual payment of \$4,000. Peace lasted only two years, when the French were forced to march against the king, who fled. In 1894 he sur-rendered, and was sent to Senegal with the chiefs who had sided with him. The French annexed the districts of Whydah, Savi, Godomey, Abomey-Kalavy, and Avrekete, and proclaimed the rest of the country a French protectorate. Later on, in 1894, Guthili was elected king, and in January, 1895, obtained French recognition.

**Dairy**, the department of a farm which is concerned with the production of milk and its manufacture into butter and cheese. As a rule the soil and climate of a country, and the nearness of suitable markets, determine in a great measure the choice between tillage and dairy husbandry. For milk dairies, cows that yield abundantly are selected, while for butter and cheese dairies the rich quality of the milk is the principal point. In the U.S. the cattle of Ayrshire and Jersey hold the first place for dairy purposes; the first on account of the large yield which they give on comparatively poor feeding, the second for the richness of their milk.

**Daisy**, the name of a plant which is very familiar, and a great favorite. It never ceases to flower, and is nearly naturalized in New England. In the days of chivalry it was the emblem of fidelity in love. Its name is literally, day's eye, because it opens and closes its flower with the daylight.

Dalber'gia, a genus of fine tropical forest trees and climbing shrubs, some species of

which yield excellent timber. The blackwood, or East India rosewood, is a magnificent tree, furnishing one of the most valuable furniture woods.

**Dalecar'lia** (or Dalarne), a tract in Sweden. The name, meaning "valley-land," is kept alive in the minds of the inhabitants by the noble struggles which the Dalecarlians, its inhabitants, made to establish and maintain the independence of the country.

**Dalhousie**, JAMES ANDREW BROWN RAMSEY, tenth Earl and first Marquis of (1812-1860), British statesman. After filling the offices of vice-president (1843) and president of the board of trade (1844), he was appointed governor general of India (1847). He greatly extended the British Empire in India, annexing the Punjab, Oude, Berar, and other native states, as well as Pegu, in Burmah.

well as Pegu, in Burmah. Dallas, Dallas co., Tex., on Trinity River. Surrounding country agricultural. Railroads: Houston & Texas Central; Gulf, Colorado & Santa Fé; Trunk; Texas Pacific; M. K. & T.; Midland. Industries: saddles, harness, and collars, cotton gins, cotton mill, flouring mills, four iron foundries, paper mills, galvanized iron and copper cornices, traveling goods, candy and cigar factories, shirt, hat, and tinware manufactures. The town was first settled in 1840 and became a city in 1856. Pop. est. 1897, 63,600.

**Dallas**, GEORGE MIFFLIN (1792-1864), statesman, b. in Philadelphia. He graduated at Princeton, in 1810. He went to Russia as private secretary to Albert Gallatin, one of the commissioners to negotiate a treaty with Great Britain through the Russian emperor. In 1817 he was made deputy attorney general of Philadelphia, of which he was elected mayor in 1828. This office he resigned to become U. S. district attorney. In 1831 he was sent to the U. S. Senate. In 1837-39 he was minister to Russia, and on his return practised law in Philadelphia. In 1844 he was elected vice-president by the Democratic party. In 1856 he was made minister to England. He returned to Philadelphia in 1861.

**Dalles** (dalz), the name given to various rapids and cataracts in the U.S. *The Great Dalles of the Columbia* are about 200 mi. from its mouth, where the river is compressed by lofty basaltic rocks into a roaring torrent about 58 yds. in width; the *Dalles of the St. Louis* are a series of cataracts, near Duluth, Minn.

are a series of cataracts, near Duluth, Minn. Daima'tia, a province of Austria, with the title of kingdom, the most southern portion of the Austrian dominions. Area 4,940 sq. mi; pop. 527,426. The inland parts of Dalmatia are diversified by undulatory ground, hills, and high mountains; there are some rich valleys, but the country is considered unproductive. The interior is occupied by a neglected population, and agriculture is in a backward state. Apples, pears, peaches, apricots, oranges, pomegranates, etc. are among the fruits: the wines are strong, sweet, and full-bodied. On the coast, fish, especially the tunny and the sardine, abound. The trade of the country is mostly confined to the coast towns, where the population is mainly of Italian extraction. Chief of these are Zara (the capital), Sebenico, Cattaro, Spalato, and Ragusa. Among the numerous islands sprinkled along the coast many are valuable for their productions, such as timber. wine, oil, cheese, honey, salt, and asphalt. After passing successively through the hands of Hungarian and Venetian rulers, and of the first Napoleon, Dalmatia finally, in 1814, fell under Austrian rule.

**Dalmat'ic** (or dalmatica). an ecclesiastical vestment worn by the deacon at mass, so called because it was an imitation of Dalmatian costume. It is worn also by bishops under the chasuble. It is a long robe with large full sleeves with black or red longitudinal stripes and partially unclosed sides.

**Dairymple**, JOHN (1648-1707), first earl of Stair, an able Scottish lawyer and statesman. It was through him that the massacre of Glencoe was perpetrated in 1692.

**Daiton**, JOHN (1766-1844), an English chemist and natural philosopher. In 1808 he announced his atomic theory of chemical action. the discovery of which spread his fame over Europe.

Daly, AUGUSTIN, playwright, b. in Plymouth, N. C., July 20, 1838; acted as dramatic editor of New York newspapers, and in 1869 began his career as a theatrical manager. He has produced many adaptations from French and German authors and a few original plays.

Dam, a bank, or construction of stone, earth, or wood across a stream for the purpose of keeping back the current to give it increased head, for holding back supplies of water, for flooding lands, or for rendering the stream above the dam navigable by increased depth. Its material and construction will depend on its situation and the amount of pressure it has to bear. For streams which are broad and deep strong materials are required, usually stone masonry bound in hydraulic cement and The common a strong framework of timber. forms of a dam are either a straight line crossing the stream transversely, or one or two straight lines traversing it diagonally, or an arc with its convex side toward the current.

Dam'ages, in law, pecuniary compensation paid to a person for loss or injury sustained by him through the fault of another. It is not necessary that the act should have been a fraudulent one; it is enough that it be illegal. unwarrantable, or malicious. If, however, a person has suffered a loss through fraud or delict on the part of another, that person has not only a claim to ordinary damages, but may also claim remote or consequential damages. and may estimate the amount of the loss he has sustained not at its real value, but at the imaginary value which he himself may put upon it, subject, however, to the modification of a judge or a jury. In other cases the damages cover only the loss sustained estimated at its real value, together with the expenses incurred in obtaining damages.

**Daman** (da-mān'), a seaport, Hindustan, 100 mi. n. from Bombay. It belongs to the Portuguese, who conquered it in 1531, and made it



a permanent settlement in 1558. The settlement, which is governed under Goa, has an area of 82 sq. mi.; pop. 49,084.

**Dam'araland**, a German protectorate in South Africa, extending along the Atlantic coast from Cape Frio to Walfisch Bay, and inland to  $20^{\circ}$  e. long. Area about 100,000 sq. mi., including a large amount of barren lands.

Damas' cus, a celebrated city, capital of the Turkish vilayet of Syria, supposed to be the most ancient city in the world. It is beautifully situated on a plain which is covered with gardens and orchards and watered by the Barrada. The appearance of the city, as it first opens on the view, has been rapturously spoken of by all travelers; but the streets are narrow. crooked, and in parts dilapidated, and, except in the wealthy Moslem quarter, the houses are low, with flat arched doors and accumulations of filth before the entrance. Within, however, there is often a singular contrast, in courts paved with marble and ornamented with trees and spouting fountains, the rooms adorned with arabesques and filled with splendid fur-niture. Among the chief buildings are the Great Mosque and the Citadel. The bazaars are a notable feature of Damascus. They are simply streets or lanes covered in with high wood work and lined with shops, stalls, cafes, etc. In the midst of the bazaars stands the Great Khan, it and thirty inferior khans being used as exchanges or market-places by the merchants. One of the most important and busiest streets is "Straight Street," mentioned in connection with the conversion of the apostle Paul. Damascus is an important emporium of trade in European manufactures; it is also a place of considerable manufacturing industry in silk, damasks, cotton, and other fabrics, tobacco, glass, soap, etc. Saddles, fine cabinet work, and elegant jewelry are well made; but the manufacture of the famous Damascus blades no longer exists. It is one of the holy Moslem cities, and continues to be the most thoroughly Oriental in all its features of any city in existence. Of its origin nothing certain is known; but it is of great antiquity, being mentioned as a place apparently of importance in Gen. 14:15. After passing successively under the power of Israelites, Persians, Greeks, and Romans, it fell at last in 1516 into the hands of the Turks. Pop. 198,600.

**Damascus-steel**, a kind of steel originally made in Damascus and the East, greatly valued in the making of swords for its hardness of edge and flexibility. It is a laminated metal of pure iron and steel of peculiar quality, carbon being present in excess of ordinary proportions, produced by careful heating, laborious forging, doubling, and twisting.

**Dam'ask**, the name given to textile fabrics of various materials, ornamented with raised figures of flowers, landscapes, and other forms, being the richest species of ornamental weaving, tapestry excepted. Damask is very commonly made in linen for table napery.

**Damaskeen'ing**, the ornamenting of iron and steel with designs produced by inlaying or incrusting with another metal, as gold, silver, etc., by etching and the like. •

**Damien, FATHER JOSEPH DE VEUSTER (1840-**1889), Roman Catholic missionary, b. at Tremeloo, Belgium, d. on Molokai Island, Hawaiian group. He entered holy orders at the age of nineteen, and devoted his life to the cause of the church. Having been sent on a mission to Honolulu he learned of the terrible condition of the lepers banished to Molokai Island, and decided to devote his life to the amelioration of their condition. He went to live among them in 1873, combining in his own person the offices of physician, teacher, carpenter, magistrate, and friend. In 1885 he contracted the fatal contagion, but continued his work until his death.

Damiet'ta, a town of Egypt, on one of the principal branches of the Nile, about 6 mi. from its mouth. It contains some fine mosques, bazaars, and marble baths. Alexandria has long diverted the great stream of commerce from Damietta, but the latter has still a considerable trade with the interior in fish and rice. Pop. 34,046.

**Dammar Resin**, a gum or resin of several kinds produced by different trees. The East Indian or cat's eye resin is got from a tree of the East Indian islands, and is used for making varnishes for coach builders, painters, etc.



Branch of Dammar Pine.

In its native localities it is burned as incense, also used for caulking ships. Sal dammar is produced by the sal tree of India, rock dammar by Hopea odorata and other species of trees; both yield good varnishes.

Damon and Pythias, two illustrious Syracusans, celebrated as models of constant friendship. Pythias had been unjustly condemned to death by Dionysius the younger, tyrant of Sicily; but, having to leave Syracuse to arrange his affairs, his friend Damon was taken as a pledge that Pythias should return on the day fixed. Pythias, however, being unexpectedly detained, had great difficulty in reaching Syracuse in time to save Damon being executed in his place; and Dionysius was so affected by this proof of their friendship that he pardoned Pythias. The Knights of Pythias, a fraternal order established in the U. S., has this pleasant incident for its basis. Its growth has been remarkably rapid, and lodges are in existence in every state of the Union.

**Damps**, noxious exhalations issuing from the earth, and deleterious or fatal to animal life. Damps exist in wells which continue long covered and not used, and in mines and coal-pits; and sometimes they issue from the old lavas of volcanoes. These damps are distinguished by miners under the names of *choke-damp*, consisting chiefly of carbonic acid gas, which instantly suffocates; and *fire-damp*, consisting chiefly of light carbureted hydrogen, so called from its tendency to explode.

**Dam'son**, a variety of the common plum. The fruit is rather small and oval, and its numerous sub-varieties are of different colors: black, bluish, dark purple, yellow, etc. The damson, as its name imports, is from Damascus.

**Dan** (Hebrew meaning "judgment"), one of the sons of Jacob by his concubine Bilhah. At the time of the exodus the Danites numbered 62,700 adult males, being then the second tribe in point of numbers. Samson was a member of this tribe.

**Dana**, CHARLES ANDERSON, editor, was b. in Hinsdale N. H., Aug. 8, 1819. After association with the N. Y. *Tribune* for fourteen years as one of the proprietors and managing editor, in 1863 was appointed assistant secretary of war. Since 1868 Mr. Dana has been editor of the N. Y. *Sun.* Perhaps more than any other journalist his personality is identified with his newspaper.

**Da'na**, JAMES DWIGHT, naturalist, b. 1813, and since 1855 a professor at Yale College. He has written System of Mineralogy; Manual of Mineralogy; Coral Reefs and Islands; Manual of Geology; Text-book of Geology; and many reports and papers.

**Dana**, RICHARD HENRY (1787-1879), writer, b. at Cambridge, Mass.; educated at Harvard; published several collections of poems and two novels. His son Richard Henry (1815-1882), was the author of the well-known work, *Two Years Before the Mast*, the result of his own experiences during a voyage recommended to him on account of his health.

**Dan'ae**, in Greek mythology, daughter of Acrisius, king of Argos. She was shut up by her father in a brazen tower, but Zeus, inflamed with passion for her, transformed himself into a golden shower, and descended through the apertures of the roof into her embraces. Set adrift on the waves by her father, she reached safely one of the Cyclades, where her child, Perseus, was brought up.

**Dan bury**, a town of Fairfield co., Conn., situated on the Still River, a tributary of the Housatonic, about 53 mi. n. n. e. of New York, with which it is connected by rail. There is a monument, erected in 1854, to the memory of General Wooster, who was mortally wounded in 1777, when the town was burned by the English under General Tryon, and another, of more recent date, to commemorate the other citizens who perished on the same occasion. The principal industry is the manufacture of hats, which was introduced in 1780, and is carried on by ten separate companies; shirts are also largely produced, and sewing machines are constructed. Pop. 16,960.

Dancing, a form of exercise or amusement in which one or more persons make a series of more or less graceful movements with measured steps in accord with music. In its earliest forms among simple races, it is a mode of outward expression for strong emotions of joy and sorrow, love and rage, and even for the most solemn and impassioned religious feelings; in more civilized strata of human society it becomes a mere frivolous amusement with no high signification whatever. Dancing corresponds to a universal primitive instinct in man. It is still practised by the South Sea Islanders, the forest Indians of Brazil, the Zulus, the negroes of Central Africa, and the native Australians, exactly as it was in the earlier stages of every civilized modern race. Many of the rude courting dances of modern savages, like the native Australian corro-boree, are themselves refinements of more ancient dances, in the survivals of which we can guess at their original grossness and obscenity. Ferocious war-dances were constantly practised by savage warriors, as the North American Indian braves, who worked themselves up into frantic mechanical intoxication capable of carrying them irresistibly on to victory. The Zulu war dance is still a noble exercise for warriors, like the Pyrrhic dance of the ancient Spartans; and the dancing and spinning dervishes in the East, who work themselves into spasms of physical excitement, are still highly esteemed for devoutness and piety. Into savage dancing, moreover, the idea of magic always enters. Thus the Mandan Indians dance Buffalo to bring game when supplies of food are low, the rain doctors of central Africa dance mystic dances to bring down rain, and the wives of Gold Coast negroes dance a battle dance to give their absent husbands courage in the battle. Everywhere in ancient religions is dancing one of the chief acts of worship. In ancient times it was generally an expression of religious, patriotic, or military feeling, as in the case of the dance of David before the ark, the choric dances, or the Pyrrhic dance of the Greeks. The Romans, however, like the Orientals, had their dancing done by hired slaves. This solemn character of the dance, has declined with the progress of refinement and civilization, and it is now nothing more than an elegant social amusement and an agreeable spectacle at public entertainments. France took the lead in inventing modern dances. Among some of the early dances which were paramount in France were the graceful minuet, the favorite for a century; the quadrille; the Ecossaise, first introduced in 1760; the galop, a death blow to the "poetry of motion." introduced from Germany: the coli-

lon, fashionable under Charles X; the polka, first danced at Odéon in 1840 by a dancingmaster from Prague; the polka tremblante, or schottisch, also of Bohemian origin, first brought out in Paris in 1844; the lancers, introduced by Laborde in 1836; and the walk, originally Bavarian, and which, now considerably modified from its original form, promises to maintain its supremacy. The French provide the world with fashions, and society everywhere has followed their lead. Characteristic of particular races or merely of classes of people are such forms of the dance as the Scotch reel, Highland fling and strathspey, the Irish jig, the negro break-downs, sailors' horn-pipes, step-dances, the can-can, morris-dances, and the like.

**Dandeli'on,** a plant indigenous to Europe, but now also common in this country. The leaves are all radical, and runcinate, or jagged on the margin. The stems are hollow and have one large, bright-yellow flower and a tapering, milky, perennial root, which acts as an aperient and tonic. The whole plant is full of a milky and bitter juice. The seed of the plant is furnished with a white pappus, and is transported far and wide by the wind.

**Dandle Dinmondt Terrier**, a peculiar breed of the Scotch terrier, so called from the border farmer of that name who figures in Scott's novel, *Guy Mannering*. This breed is known by its short legs, wiry and abundant hair, and large ears. It is very courageous when fully grown. It is usually either of a light-brown or a bluish-gray color, termed respectively the "mustard" and the "pepper" variety.

"mustard" and the "pepper" variety. Danenhower, JOHN WILSON (1849-1887), American Arctic explorer, graduated at the U. S. naval academy in 1870, and in 1879 sailed from San Francisco as second in command of the Jeannette under Lieut. George W. DeLong. The steamer was lost in the ice, but the explorers escaped, and returned home in 1882.

**Dan'iel,** the prophet, a contemporary of Ezekiel, was b. of a distinguished Hebrew family. In his youth, B. c. 605, he was carried captive to Babylon, and educated in the Babylonish court for the service of King Nebuchadnezzar. Thrown into the lions' den for conscientiously refusing to obey the king he was miraculously preserved, and finally made prime minister in the court of the Persian king, Darius.

**Dan'iell**, JOHN FREDERICK (1790-1845), English physicist. In 1820 he published an account of a new hygrometer which he had invented. Soon afterward his valuable works, *Meteorological Essays* and the essay on *Artificial Climate*, appeared. In 1831 he was appointed professor of chemistry in King's College, London, and made further important discoveries, chief among which is his apparatus for maintaining a powerful and continuous current of electricity in galvanic batteries.

**Daniell's Battery**, a galvanic battery the cells of which were originally constructed in the following way: A tall, cylindrical copper vessel was nearly filled with saturated solution of sulphate of copper. A rod of amalgamated zinc was enclosed in a skin or bladder, which

was filled with dilute sulphuric acid, and was suspended in the copper cylinder. When the zinc rod was connected by a wire with the copper vessel, which itself forms one of the plates of the battery, the current passes, ac-cording to common phraseology, from the copper through the wire to the zinc. Instead of the bladder or skin, porous earthenware pots are now employed to contain the dilute sulphuric acid in which the zinc is immersed. In improved modifications of Daniell's battery the most important change is that of substituting for the dilute sulphuric acid that surrounds the zinc, solution of sulphate of zinc, and in this case the zinc is not amalgamated. By doing away with the sulphuric acid local waste of the zinc is to a great extent prevented, and the solution of sulphate of zinc is used instead of pure water on account of the very high resistance of water impregnated with salts.

**Dannemo'ra**, a village on a lake of the same name, 24 mi. n.n.e. of Upsala, in Sweden, celebrated for its iron mines, the second richest in Sweden, which have been worked uninterruptedly for upward of three centuries, and produce the finest iron in the world.

**Dante** (a contraction of *Durante*), ALIGHIERI (dån' tā å-lē-gē-ā' rē) (1265-1321), the great Italian poet, was b. in Florence of a family belonging to the lower nobility. His education was confided to the learned Brunetto Latini. He seems to have been quite a boy, no more than nine years of age, when he first saw Beatrice Portinari, and the love she awakened in him he has described in that record of his early years, the Vita Nuova, as well as in his later great work, the Divina Commedia. Dante married Gemma dei Donati in 1828, by whom he had seven children. At this time the Guelfic party in Florence became divided into the rival factions of Bianchi and Neri (Whites and Blacks), the latter being an extreme papal party, while the former leaned to reconciliation with the Ghibellines. Dante's sympathies were with the Bianchi, and being a prior of the trades and a leading citizen in Florence he went on an embassy to Rome to influence the pope on behalf of the Bianchi. In Dante's absence his enemies obtained a decree of ban-ishment against him. The poet remained an exile to the end of his life; and his history, first lost by the indifference of contemporaries and then hallowed by the legends of later generations, becomes semimythical. During this period he is said to have visited many cities, Arezzo, Bologna, Sienna, etc., and even Paris. In 1320 we find him staying at Ravenna with his friend Guido da Polenta. He was buried at Ravenna, where his bones still lie. His great poem, the Dirina Commedia (Dirine Comedy), written in great part, if not altogether, during his exile, is divided into three parts, entitled *Hell*, *Purgatory*, and *Paradise*. The poet dreams that he has wandered into a dusky forest, when the shade of Vergil appears and offers to conduct him through hell and purgatory. Further the pagan poet may not go, but Beatrice herself shall lead him through

paradise. The journey through hell is first described, and the imaginative power with which the distorted characters of the guilty and the punishments laid upon them, are brought before us; the impressive pathos of these short histories - often compressed in Dante's severe style into a couple of lines -of Pope and Ghibelline, Italian lord and lady; the passionate depth of characterization, the subtle insight and intense faith, make up a whole which for significance and completeness has, perhaps, no rival in the work of any one man. From hell the poet, still in the company of Vergil, ascends to purgatory, where the scenes are still mostly of the same kind though the punishments are only temporary. In the earthly paradise Dante beholds Beatrice in a scene of surpassing magnificence, ascends with her into the celestial paradise, and after roaming over seven spheres reaches the eighth, where he beholds "the glorious company, which surrounds the triumphant Redeemer.' In the ninth Dante feels himself in presence of the divine essence, and sees the souls of the blessed on thrones in a circle of infinite magnitude. The Deity himself, in the tenth, he cannot see for excess of light. There are many notable translations of Dante's great poem in many languages.

**Danton** (dan-ton), GEORGE JACQUES (1759-1794), one of the figures in the French Revolution. He was foremost in organizing and conducting the attack on the Tuileries, Aug. 10, 1792. He voted for the capital punishment of all returning aristocrats, and along with Robespierre brought Hébert and the worshipers of the goddess Reason to the scaffold. Robespierre succeeded in having Danton denounced and thrown into prison, 1794. Afterward he was condemned by the revolutionary tribunal as an accomplice in a conspiracy for the restoration of monarchy, and executed.

**Dantzig** (or Danzig) (dånt'zik), a fortified town and port, Prussia, capital of the province of West Prussia, 253 mi. n.e. Berlin, on the Vistula, about 3 mi. above its mouth. It is one of the most important seaports in the Prussian monarchy. Among the principal buildings are the Dom or Cathedral, begun in 1343, the church of St. Catherine, the exchange, the arsenal, observatory, three monasteries, two synagogues, two theaters, etc. The industries are, shipbuilding, artillery, and beer. The prosperity of the town is founded chiefly on its transit trade, particularly in wheat from Poland. There is also a considerable trade in amber. The proper port of Dantzig is Neufahrwasser, at the mouth of the Vistula. After being alternately possessed by the Teutonic knights and the Poles, Dantzig, on the partition of Poland, fell to the lot of Prussia. Pop. 120,338.

**Dan'ube**, a celebrated river of Europe, originates in two small streams rising in the Schwarzwald, or Black Forest, in Baden, and uniting at Donaueschingen. The direct distance from source to mouth of the Danube is about 1,000 mi. and its total length, including windings, about 1,670 mi. From its source the

Danube flows in a northeasterly direction to Ulm, in Würtenberg, where it becomes navigable for vessels of 100 tons; then to Ratisbon in Bavaria, where it becomes navigable for steam-Here it turns in a southeasterly direction, ers. entering Austria at Passau, passing Vienna and Budapest, above which latter town it suddenly turns due south, holding this direction till it is joined by the Drave, after which it runs s.s.e. and enters Servia at Belgrade. Continuing its general course eastward it forms for a long distance the boundary line between Roumania and Bulgaria. At Silistria it once more turns northward, and flowing between Roumania and Bessarabia falls into the Black Sea by three different outlets. The Danube may be estimated as admitting of about 2,500 mi. of steam navigation.

**Dan'vers**, a town in the county of Essex, in Massachusetts, 15 mi. n.n.e. of Boston, with which it is connected by rail. The principal industry is the manufacture of boots and shoes. The most interesting building is the Peabody Institute, with its library and art collections, founded in 1852 by George Peabody, the philanthropist, who was b. at Danvers in 1795. Pop. 7,446.

vers in 1795. Pop. 7,446. **Danville**, a city of Illinois, the county seat of Vermilion co., 125 mi. s. of Chicago. Situated in a rich and populous district, in the vicinity of an extensive coal-field, and well supplied with building materials and water, it forms a manufacturing center with foundries, wagon works, locomotive works, and various other industrial establishments. The railroad communications are extensive, there being seven branches of road centering here under the control of three main systems. Pop. 11.-491.

**Danville**, the county seat of Boyle co., Ky. It is an educational center of some note, being the seat of two colleges. A deaf and dumb asylum is also located here. The principal industry of the surrounding country is agriculture.

**Danville**, Pittsylvania co., Va., on Dan River, 140 mi. s.w. of Richmond. Railroads: Southern Ry., Danville & Western, and Atlantic & Danville. Industries: six cotton mills, fiour mill, two iron foundries, knitting mills, twelve tobacco factories. Surrounding country agricultural and mineral. Danville was base of supplies for confederacy in 1861-65. The town was first settled in 1798. Under Virginia law every town is a city when it reaches 5,000 inhabitants. In 1890 Neapolis on n. side of river was annexed. Pop. est. 1897, 22,000.

**Danville,** Montour co., Pa., on n. branch of Susquehanna River, 154 mi. n.w. of Philadelphia. Railroads: Pennsylvania branch of S. H. & W., P. & R., and D. L. & W. Industries: steel and iron, flour mill, four iron foundries, silk mill, suspender, overall, and stocking factories. Surrounding country agricultural and mineral. The town was first settled in 1774. Pop. est. 1897, 8,000.

Daph' nia, the water flea, a genus of minute crustaceans belonging to the division Branch-

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iopoda. The best-known species is the "branch horned" water flea, which is a favorite microscopic object. The head is prolonged into a snout, and is provided with a single, central, compound eye; it is also furnished with antennæ, which act as oars, propelling it through the water by a series of short springs or jerks. These animals are very abundant in many ponds and ditches; and as they assume a red color in summer impart the appearance of blood to the water.

Dar' danelles (-nelz; anc. Hellespont), a narrow channel which connects the Sea of Marmora with the Grecian Archipelago, and at this particular point separates Europe from Asia. It is about 40 mi. in length, and varies in breadth from 1 to 4 mi. A rapid current often much increased by winds runs southward. On the Asiatic side the country is fine and fertile, rising gradually upward from the sea to the range of Mount Ida; the European side is steep and rugged, but densely peopled and highly cultivated. On both shores there are numerous forts and batteries. Two castles on the opposite shores occupy the sites of ancient Sestos and Abydos, and recall the story of Hero and Leander. By treaty made in 1841 between the five great powers and Tur-key, confirmed by the Peace of Paris in 1856, it is settled that no foreign man-of-war shall pass the strait without the express permission of the Turkish government.

**Dare**, VIRGINIA, first English child b. in new world, b. at Roanoke, 1587. She was a granddaughter of Gov. John White.

**Darfur'** (or DARFOOR'), a considerable region of Central Africa, forming a large oasis in the s.e. corner of the Great Desert. Area 198,000 sq. mi.; pop. 1,420,000. The inhabitants are Mohammedans and negroes, and semi-barbarous. Their occupation is chiefly agriculture, and cattle form their principal wealth. It exports slaves, ivory, ostrich feathers, gum, copper, etc., and receives in exchange sugar, cotton cloth, hardware, firearms, etc.

Da'rien, GULF OF, a gulf of the Caribbean Sea, at the n. extremity of South America, between the Isthmus of Panama and the mainland.

**Darlen**, ISTHMUS OF, often used as synonymous with the Isthmus of Panama, but more strictly applied to the neck of land between the Gulf of Darien and the Pacific.

**Darien Scheme**, a celebrated financial project, conceived and set afloat by William Paterson, a Scotsman, toward the close of the seventeenth century. Paterson was a man of bold conceptions, and possessed of a wide knowledge of commerce and finance. He was the first projector of the Bank of England, but was disappointed of his just recompense. His next scheme was one of magnificent proportions. He proposed to form an emporium on each side of the Isthmus of Darien or Panama for the trade of the opposite continents. The settlement thus formed would become the entrepôt for an immense exchange between the manufactures of Europe and the produce of South America and Asia. Scotland subscribed \$2,000,000, a full half of all the cash in the kingdom. Little more than the half, however, was paid up. In 1698 five large vessels laden with stores, etc., and with 1,200 intending colonists, sailed for the Isthmus of Darien. The settlement was formed in a suitable position, and the colonists fortified a secure and capacious harbor; but nothing else had been rightly calculated, and at the end of eight months the survivors were compelled by disease and famine to abandon their settlement and return to Europe. Two of the ships were lost on the way home, and only about thirty, including Paterson, reached Scotland.

Darl'us, the name of several Persian kings. 1, DARIUS I, fourth king of Persia, son of Hystaspes, a prince of the royal family of the Achæmenidæ, attained the throne in B. c. 521. He reduced, after a two years' siege, the re-volted city of Babylon, and led an expedition of 700,000 men against the Scythians on the Danube. He sent an army under Mardonius to invade Greece. But the ships of Mardonius were destroyed by a storm in doubling Mount Athos (492 B C.), and his army was cut to pieces by the Thracians. Darius, however, which was met on the plains of Marathon by an Athenian army 10,000 strong, under Miltiades, and completely defeated (490 B.c.). Darius had determined on a third expedition when he d. B.C. 485. 2, DARIUS II, surnamed Nothos, or the Bastard, by the Greeks, an illegitimate son of Artaxerxes I. He ascended the throne in 423, and d. in 404. His son Cyrus is familiar to us through Xenophon's Anabasis. 3, DARIUS III, surnamed Codomannus, great grandson of Darius II, was the twelfth and last king of Persia. He ascended the throne B.C. 336, when the kingdom had been weakened by luxury and the tyranny of the satraps under his predecessors, and could not resist the attacks of Alexander of Macedon; and the army which was sent against him by Darius was totally routed on the banks of the Granicus, in Asia Minor. Darius then hastened with 400,000 soldiers to meet Alexander in the mountainous region of Cilicia, and was a second time totally defeated near the Issus, B.C. 333. Two years afterward, all proposals for peace having been rejected by Alexander, Darius collected a second army, and meeting the Macedonian forces between Arbela and Gaugamela was again routed (331 B.C.). Alex-ander captured Susa the capital, and Per-sepolis, and reduced all Persia. Meanwhile Darius was collecting another army at Echatana in Media, when a traitorous conspiracy was formed against him by which he lost his life in 330 B.C. Alexander married his daughter Statira.

**Darjeel'ing** (or Darjiling), a district of India, in the extreme north of the lieutenantgovernorship of Bengal, division of Cooch-Behar. Area 1,164 sq. mi.; pop. 223,114. Tea, coffee, cinchona, and cotton are cultivated more or less, and the cultivation of the teaplant and the making of tea is now the staple industry. DARJEELING, the chief town in the district, is a sanatory station for the British troops.

**Dar' laston**, a town of England, county of Stafford. It has extensive coal and iron mines. Pop. 14.422.

**Darley**, FELIX OCTAVIUS CARR (1822–1888), artist, b. in Philadelphia. While a clerk in a mercantile house in Philadelphia, he produced some humorous sketches, which were so highly praised that he devoted himself to the pursuit of art by making drawings for engravers. In 1848 he went to New York City. His illustrations for books became innumerable. Some of his sketches were reduced, to appear on government bonds and bank-notes.

**Darling** (from a governor of New South Wales), a name of several applications in Australia. The *Darling Ricer*, a river rising in the n.e. of New South Wales, flows in a southwesterly direction till it joins the Murray. *Darling District* is a pastoral district, about 50,000 sq. mi. in extent, in the s.w. of New South Wales, and watered by the Darling and the Murray. The *Darling Downs* are a rich table-land west of Brisbane in Queensland. It is well watered, and measures about 6,000 sq. mi. The *Darling Range* is a range of granite mountains in Western Australia, running in a northerly direction parallel with the coast from Point D'Entrecasteaux for 250 mi.

Darling, GRACE (1815-1842), a celebrated English heroine; b. in the Longstone Lighthouse, of which her father was keeper. In 1838 the steamer Forfarshire, with forty-one passengers on board besides her crew, became disabled off the Farne Islands during a storm, and was thrown on a rock where she broke in two, part of the crew and passengers being left clinging to the wreck. Next morning William Darling descried them from Longstone, about a mile distant, but he shrank from attempting to reach the wreck through a boiling sea in a boat. His daughter Grace, however, implored him to make the attempt and let her ac-company him. At last he consented, and father and daughter each taking an oar, they reached the wreck and succeeded in rescuing nine sufferers. The news of the heroic deed soon spread, and the brave girl received testimonials from all quarters. A purse of \$3,500 was publicly subscribed and presented to her. Four years afterward she died of consumption.

**Dar' lington**, a municipal borough of England, county and 17½ mi. s. of Durham, well built, chiefly of brick. The woolen manufacture is carried on to a considerable extent, and there are large iron works, and works manufacturing steel, locomotive engines, iron bridges, etc. Pop. 38,000.

**Darmstadt** (dårm ståt), a town in Germany, capital of the grand-duchy of Hesse, 15 mi. s. Frankfort. Among the remarkable buildings are the old palace, the Catholic church, and the Rathhaus or townhall built in 1580. Darmstadt has some iron foundries, breweries, etc., but depends more upon the residence of the court than upon either trade or manufactures. Pop. 56,399.

**Dar'nel**, the popular name of a species of

poisonous grass. It appears to be the tares of Scripture. Its properties are said to be narcotic and stupefying, but recent researches have cast some doubt on its reported deleterious qualities. It is met with in corn fields, and is now naturalized in North America.

Darn'ley, HENRY STUART, LORD (1541-1567), son of the Earl of Lennox and Lady Margaret Douglas, a niece of Henry VIII, and by her first marriage queen of James IV. In 1565 he was married to Mary Queen of Scots. It was an unfortunate match. Mary affected, however, to be reconciled to him, but could not long conceal her contempt for the handsome imbecile. After the birth of a son, subsequently James VI, Darnley was seized at Glasgow with smallpox, from which he had barely recovered when Mary visited him, and had him conveyed to an isolated house called Kirk of Field, close to the Edinburgh city walls. This dwelling, which belonged to a retainer of Bothwell's, the rapidly rising favorite, was blown into the air with gunpowder. The dead bodies of the king and his page were found in a field at a distance of 80 yards from the house.

Darrah, MRS. LYDIA, heroine. She was a Quaker and resided in Philadelphia. When the British Army was there the adjutant general hired one of her rooms for private con-On Dec. 2, 1777, some particular ferences. and emphatic directions were given that excited her curiosity. She listened at the door of the meeting room, and heard an order read that the British soldiery should march out of camp on December 4 to attack the Americans then quartered 8 mi. distant. On the following morning she walked several miles on the snowy ground, and approached the American camp. Here she met Colonel Craig, and gave him the information. When the British movement was made, they found the army of Washington prepared to meet them at all points, and the enterprise miscarried.

**Darters** (or Snake Birds), a genus of webfooted birds of the pelican tribe, found near the eastern coasts of the tropical parts of



Darter.

America, and on the western coast of tropical Africa, as well as in Australia. The birds perch on trees by the sides of lakes, lagoons, and rivers, and after hovering over the water suddenly dart at their finny prey with unerring aim. From the serpent-like form of their head and neck, the head being scarcely thicker than the neck, they are called snake birds.

**Dart' ford**, a town, England, Kent, 15 mi. s.e. of London. On the river are numerous paper, corn, and oil mills, a large foundry, and an extensive gunpowder manufactory, etc. Dartford was the first place in Britain where a paper mill was erected. Wat Tyler was a native of this place, and the insurrection known by his name broke out at Dartford (1377). Pop. 11,062.

**Dartmoor',** an extensive upland tract in England, in the western part of Devonshire, and belonging to the duchy of Cornwall; area 150.000 acres. Cattle and sheep are fed on the coarse grass during the summer months. Several of the rugged granite hills are of considerable height. Dartmoor prison, built in 1809 as a state-prison, is now a convict depôt.

**Dartmouth College.**—This institution is the outgrowth of an Indian school which was opened in 1754. A few years later English students were admitted, and in 1765, £1,000 was raised in England and placed in charge of trustees. It was named after the Earl of Dartmouth. The present site was chosen in 1769 and the first students were graduated in 1771. A suit for the control of the college was instituted between the state and the college, and decided in 1819 in favor of the trustees. Daniel Webster was attorney for the college. There is a medical department, school of science and art, college of agriculture and mechanical arts, and civil engineering school. The income is \$75,000; students, 560; professors, 48: books, 75,000.

**Darwen**, OVER, a borough of Lancashire, England, 3<sup>1</sup>/<sub>2</sub> mi. s. of Blackburn. Until about the middle of this century Over Darwen was an insignificant village; now it is a populous and thriving town. The staple manufacture is cotton; other manufactures are paper, iron castings, earthenware, etc. Pop. 34,192.

**Dar' win**, CHARLES ROBERT (1809-1882), a noted English naturalist. He early devoted himself to the study of natural history, and in 1831 he was appointed naturalist to the surveying voyage of H.M.S. *Beagle*, commanded by Captain Fitzroy. Darwin came home with rich stores of knowledge, part of which he soon gave to the public in various works. In 1839 he married his cousin, Emma Wedgwood, and henceforth spent the life of a quiet country gentleman, engrossed in scientific pursuits—experimenting, observing, recording, reflecting, and generalizing. In 1859 his name attained its great celebrity by the publication of *The Origin of Species by Means of Natural Selection.* This work, scouted and derided though it was at first in certain quarters, may be said to have worked nothing less than a

revolution in biological science. In it for the first time was given a full exposition of the theory of evolution as applied to plants and animals, the origin of species being explained on the hypothesis of natural selection. The rest of his works are largely based on the material he had accumulated for the elaboration of this great theory. The principal are a treatise on the Fertilization of Orchids (1862); Domesticated Animals and Cultivated Plants; or The Principle of Variation, etc., under Domestication (1967); Descent of Man and Variation in Relation to Sex (1871); The Expression of the Emotions in Man and Animals (1872); Morements and Habits of Climbing Plants (2d. ed. 1875); Insectivorous Plants (1875); Cross and Self Fertilization (1876): The Power of Movement in Plants (1880); The Formation of Vegetable Mold (1881), the last containing a vast amount of information in regard to the common earthworm. Mr. Darwin was buried in Westminster Abbey.

Dar' winism, the views, especially regarding the origin and development of animals and plants, expressed in detail and advocated with much earnestness in the works of Charles What has come to be known as "the Darwin. Darwinian theory" is the position that all forms of living organism, including man, have been derived or evolved through heredity, from certain primitive states or conditions of existence, during the struggle for existence of individual organisms, which results, through natural selection, in the survival of those least exposed, or, in the words of the distinguished author, "the survival of the fittest." Mr. Darwin especially advocated, as distinct from other writers on biology and evolution, these ideas: the inherent susceptibility and tendency to variation according to conditions of environment; the preservation and perfection of organs best suited to the needs of the individual in its struggle for existence; the per-petuation of the more favorably organized beings, and the destruction of those less fitted to survive; the operations of natural selection, in which sexual selection is an important factor, and the general proposition that at any given time any given organism represents the result of the foregoing factors, acting in opposition to the hereditary tendency to adhere to the type, or "breed true." See *Evolution*. **Dass**, PETER (1647-1708). Norwegian poet,

**Dass**, PETER (1647-1708), Norwegian poet, of Scottish extraction He is known as the "father of Norwegian poetry," and his principal poem, *The Trumpet of Northland*, is one of the most favorite national poems.

**Das'yure** (dasyu'rus), the brush-tailed opossums, a genus of plantigrade marsupials found in Australia and Tasmania, and so named in contrast to the opossums of this country which have naked tails somewhat like rats. The ursine dasyure of Tasmania is about the size of a badger, but of a sturdier form, of a dull black color, carnivorous, and of a savage temper. Formerly it was most destructive to flocks and poultry yards, but is now in the inhabited districts nearly extirpated. The various species of the genus have much the same nature and habits as the European polecat. Date



Tasmania Devil.

Date, the fruit of the date palm or the tree itself. The fruit is used extensively as an article of food by the natives of Northern Africa and of some countries of Asia. It consists of an external pericarp, separable into three portions, and covering a seed which is hard and horny in consequence of the nature of the albumen in which the embryo plant is buried. Next to the cocoanut tree the date is unquestionably the most interesting and use-ful of the palm tribe. Its stem shoots up to the height of 50 or 60 ft. without branch or division, and of nearly the same thickness throughout its length. From the summit it throws out a magnificent crown of large feather-shaped leaves, and a number of spadices, each of which in the female plant bears a bunch of from 180 to 200 dates, each bunch weighing from 20 to 25 lbs. The fruit is eaten fresh or dried. Cakes of dates pounded and kneaded together are the food of the Arabs who traverse the deserts. A liquor resembling wine is made from dates by fermentation. Persia, Palestine, Arabia, and the north of Africa are best adapted for the culture of the date tree, and its fruit is in these countries an important article of food.

**Date plum,** the name given to several species of *Diospyros*, a genus of trees of the ebony family. The European date plum is the *D*.



a-Bunch of dates; b.-Portion of leaf.

Lotus, a low-growing tree, native of the south of Europe. It produces a small fruit, the supposed lotus of the ancients. The American date plum, or persimmon, attains a height of 50 or 60 ft.; the fruit is nearly round, about an inch in diameter, is very austere, but edible after being frosted. The Chinese date plum is cultivated for the sake of its fruit, which is about the size of a small apple, and is made into a preserve.

Dath olite, the siliceous borate of lime, a mineral of a white color of various shades found in Scotland and on the Continent; also near Lake Superior, where it is used in the manufacture of boracic acid.

**Daudet** (dö-dā), ALPHONSE, French novelist, b. at Nimes 1840. He settled in Paris in 1857, and wrote poems, essays, plays, etc., without much success, till he discovered his powers as a novelist, when he speedily rose to the highest rank. His elder brother, ERNEST DAUDET, b. 1837, has also distinguished himself as a novelist and one of the best known political writers of the French republican party.

**Dau' phin**, the title of the eldest son of the king of France prior to the revolution of 1630, said to be derived from the dolphin, the crest of the lords of Dauphiny. The name was assumed toward the middle of the ninth century by the lord of Dauphiny, which province was bequeathed by Humbert II to the king of France in 1349, on condition that the heir of the throne should bear the title of Dauphin of Viennois.

**Dauw** (da'u) (or Peechi) (Equus Burchell), a species of Zebra which inhabits the plains of Southern Africa, particularly to the n. of the Orange River. Its general color is a pale brown, with grayish-white on the abdomen and inner parts of the limbs. Its head, neck. and body, and the upper parts of its limbs are striped like the zebra, but the stripes are not so dark in color.

Dav'enant, SIR WILLIAM (1605-1688), English poet and dramatist. He flourished under Charles II. His works consist of dramasmasques, addresses, and the epic Gondibert, which was never fluished, but he is remembered chiefly by the travesty of Shakespeare's Tempest, made in conjunction with Dryden. He was buried in Westminster Abbey.

**Davenport,** Scott co., Iowa, on the Mississippi River, 182 mi. w. from Chicago. Railroads: C. R. I. & P.; C. B. & Q.; B. C. R. & N.; C. M. & St. P.; Rock Island & Peoria. The lumber industry employs a great many men. and there are four flouring mills, woolen mill, iron foundry, packing company, and other factories. The surrounding country is agricultural. The town was first settled in 1835 by Col. Geo. Davenport and Antonio LeClair. and became a city in 1830. Pop. est. 1897, 36,000.

Davenport, EDWARD LOOMIS (1814-1877), b. in Boston, Mass., actor. He was a judicious and finished performer, who never rose to particular distinction. "St. Marc," in a play of his own: "Hamlet," "Sir Giles Overreach." and "William," in Black Eyed Susan, were

among his best performances. His wife, Fanny Elizabeth Vining, b. in 1819, was associated with him in his starring engagements.

**Davenport,** FANNY, daughter of the foregoing, b. in London, England, April 10, 1850, went on the stage as a child, and became a star. She married in 1879 an actor named Edwin H. Price.

David, king of Israel, the youngest son of Jesse, a citizen of Bethlehem, and descended through Boaz from the ancient princes of Judah. The life of David is recorded in the first and second books of Samuel and the first book of Chronicles. The book of *Psalms*, a large portion of which has been attributed to him, also contains frequent allusions to incidents in his life. He reigned from 1055 B. c. to 1015 B. c. according to the usual chronology, but recent investigations put the dates of David's reign from 30 to 50 years later. Under David the empire of the Israelites rose to the height of its power, and his reign has always been looked on by the Jews as the golden age of their nation's history.

**David**, JACQUES LOUIS (1748-1825), founder of the modern French school of painting. He went to Rome in 1774, and passed several years there painting several important pictures. A second visit produced the *Horatii*, one of his masterpieces. In 1787 he produced *The Death of Socrates*, in 1788 *Paris and Helen*, and in 1789 *Brutus*. He was appointed first painter to Napoleon about 1804; and after the second restoration of Louis XVIII he was included in the decree which banished all regicides from France, when he retired to Brussels.

**David**, PIERRE JEAN (1789-1856), a French sculptor, born at Angers. In 1831 he began the magnificent sculptures of the Pantheon, his most important work, which he finished in 1837. He executed a great number of medallions, busts, and statues of celebrated persons of all countries.

**David,** SAINT, patron of Wales, archbishop of Caerleon, and afterward of Menevia, now St. David's, where he d. about 601. He was celebrated for his piety, and many legends are told of his miraculous powers.

told of his miraculous powers. **Davis,** DAVID (1815-1886), jurist, b. in Cecil co., Md. He studied law in Massachusetts and Connecticut, and removed to Illinois in 1835. In 1844 he was a member of the state legislature, and from 1848 was circuit judge. In October, 1862, President Lincoln appointed him associate justice of the Supreme Court. Judge Davis was nominated by the labor reformers for president in 1872. In March, 1877, he took his seat in the U. S. Senate.

**Davis,** HENRY WINTER (1817-1865), statesman, was b. in Annapolis, Md. As member of Congress was a brilliant orator. Although representing a slave state he was unfaltering in fidelity to the Union and a strenuous advocate of emancipation, and as early as 1865 favored negro suffrage.

Davis, JEFFERSON (1808-1889), president of the Confederate States of America during the Civil War; b. in Kentucky. He was trained at

West Point Military Academy, and from 1828 to 1835 saw a good deal of service on the frontier. At the latter date he became a cotton planter in the state of Mississippi. He was elected to Congress in 1845, but at the commencement of the Mexican War he left Congress and engaged actively in the contest. He entered the Senate in 1847, and held various posts in the government, upholding the policy of the slave states and the doctrine of slave rights. On the outbreak of the Civil War he was chosen president of the Southern states, was taken prisoner after the fall of Richmond, imprisoned for two years in Fortress Monroe, and set at liberty by the general amnesty of 1868.

Davis, JEFFERSON C. (1829-1879), soldier, b. in Clark co., Ind. He fought in the Mexican War and received a commission in the regular army. In April, 1861, he was at Fort Sunter, and later commanded a division in Tennessee. He was with Sherman's army in the march to the sea, and in 1865 received a major general's brevet and became colonel of the Twenty-third Infantry.

Davis, JOHN CHANDLER BANCROFT, jurist, b. in Worcester, Mass., in 1822; acted as agent for the U. S. before the Geneva court of arbitration. In 1869 and again in 1873, he was assistant secretary of state. He was next minister to Berlin (1872-1877), then judge of the Court of Claims (1877-1882), and reporter of the U. S. Supreme Court.

**Davis,** NoAH, b. in Haverhill, N. H., in 1818. In July, 1870, he became U. S. district attorney for the southern district of New York, and in 1872 was again elected to the State Supreme Court of which he became presiding justice in 1874. He retired from the bench in 1887.

**Davis's Strait**, a narrow sea which separates Greenland from Baffin's Land, and unites Baffin's Bay with the Atlantic Ocean.

fin's Bay with the Atlantic Ocean. **Davitt**, MICHAEL, b. in 1846 in county Mayo, Ireland. In 1870 he was sentenced to fifteen years' imprisonment for treason-felony, but was released in 1878. The next year he founded, in conjunction with Charles S. Parnell, the Irish land league. He made a tour of the U. S. on behalf of that organization in 1880; and on his return to England was again arrested on his old sentence, and held in prison for fifteen months. While he was in prison, he was elected a member of Parliament, but was not permitted to take his seat.

**Davos** (då-vös'), an elevated valley of Switzerland, canton Grisons, containing several villages; a winter resort of persons suffering from chest diseases.

**Davout** (or Davoust) (dä-vö), LOUIS NICOLAS, duke of Auerstädt and prince of Eckmühl, marshal and peer of France (1770–1823). He went with Bonaparte to Egypt in 1708, and commanded the cavalry of the army of Italy in 1800. He shared the glory of Eylau, Eckmühl, and Wagram; was made governor of Hamburg; took part in the Russian campaign of 1812, and was wounded at Borodino. During the Hundred Days (1815) he was Napoleon's minister of war, and after Waterloo, was appointed by the provisional government general-in-chief of the French armies.

Da'vy, Sir HUMPHRY (1778-1829), a distinguished English chemist. He was appointed professor of chemistry in the Royal Institution at the age of twenty-four. In 1803 he was chosen a member of the Royal Society. His discoveries with the galvanic battery, his decomposition of the earths and alkalies and ascertaining their metallic bases, his demonstration of the simple nature of the oxymuriatic acid, etc., obtained him an extensive reputation. The numerous accidents arising from fire-damp in mines led him to enter upon a series of experiments on the nature of the explosive gas, the result of which was the invention of his safety lamp.

**Da'vyum** (after Sir H. Davy), a metal of the platinum group discovered in 1877. It is a hard, silvery metal, slightly ductile, extremely infusible.

**Dawes**, HENRY L., U. S. Senator from Massachusetts, was b. in Cummington, Mass., Oct. 30, 1816. He graduated at Yale College and studied law. After serving as member of House for seven consecutive terms, in 1874. elected U. S. Senator; re-elected 1881 and 1887.

**Dawson,** HENRY (1811-1878), English landscape painter. Among the best of his pictures are Wooden Walls of Old England, London from Greenwich Hill, Houses of Parliament, The Rainbow, Rainbow at Sea, The Pool Below London Bridge.

**Dawson,** SIR JOHN WILLIAM, b. 1820 at Picton, Nova Scotia; Canadian geologist. He was educated at Picton and Edinburgh University. He accompanied Sir Charles Lyell when examining the geology of Nova Scotia in 1842. In 1850 he became superintendent of education for Nova Scotia, and in 1855 principal and professor of natural history in M'Gill College, Montreal, in which position, as well as in that of vice-chancellor, and, latterly, principal of the university, his services in the cause of education have been very marked. He became a member of the Royal Society in 1862.

Day, either the interval of time during which the sun is continuously above the horizon, or the time occupied by a revolution of the earth on its axis, embracing this interval, as well as the interval of darkness. The day in the latter sense may be measured in more than one way. If we measure it by the apparent movement of the stars, caused by the rotation of the earth on its axis, we must call day the period between the time when a star is on the meridian and when it again returns to the meridian; this is a sidereal day. It is uniformly equal to 23 hours, 56 minutes, 4,098 seconds. But more important than this is the solar day, or the interval between two passages of the sun across the meridian of any place. The latter is about four minutes longer than the former, owing to the revolution of the earth round the sun, and it is not of uniform length, owing to the varying speed at which the earth moves in its orbit and to the obliquity

of the ecliptic. For convenience an average of the solar day is taken, and this gives us the mean solar or civil day of twenty-four hours, the difference between which and the actual solar day at any time is the equation of time. The length of the days and nights at any place varies with the latitude and season of the year, owing to the inclination of the earth's axis. In the first place, the days and nights are equal all over the world on the 21st of March and the 21st of September, which dates are called the *vernal* (spring) and *autumnal equinozes*. Again. the days and nights are always of equal length at the equator, which, for this reason, is some-With these times called the equinoctial line. exceptions, we find the difference between the duration of the day and the night varying more and more as we recede from the equator.

The Babylonians began the day at sunrising: the Jews at sunsetting; the Egyptians and Romans at midnight, as do most modern peoples. The civil day in most countries is divided into two portions of twelve hours each. The abbreviations P.M. and A.M. (the first signifying post meridiem, Latin for afternoon; the latter ante meridiem, forenoon) are requisite, in consequence of this division of the day. The Italians in some places reckon the day from sunset to sunset, and enumerate the hours up to twentyfour; the Chinese divide it into twelve parts of two hours each. For astronomical purposes the day is divided into twenty-four hours instead of two parts of twelve hours. Formerly it began at noon, but since Jan. 1, 1885, the day of twenty-four hours begins at midnight at Greenwich observatory; and this reckoning is now generally adopted for astronomical purposes elsewhere than at Greenwich. The poses elsewhere than at Greenwich. The Greenwich day practically determines the date for all the world. At mid-day at Greenwich the date (day of the week and month) is everywhere the same, though there are all possible differences in naming the hour of the day. But mid-day at Greenwich is the only instant at which we ever have the same date all over the world. The meridian of midnight, which is then at 180° e. or w., goes on revolving, gradually bringing a new date to every place to the west of that line, but obviously not bringing that new date to the places immediately to the east of that line till twenty-four hours after. From this it follows that whereas places on the one side of the globe never have a different date except when midnight lies between them. places on the opposite side of the globe, and on different sides of the meridian of 180° e. or w.. never have the same date except when midnight lies between them.

Day, THOMAS (1748-1789), an ingenious writer, of a benevolent, independent, but eccentric spirit, was b. at London. He wrote in prose and verse, on various subjects, but the *History of Sanford and Merton*, a popular book for boys, is the only work by which his name is perpetuated.

**Dayfly**, the popular name of those neuropterous insects which belong to the genus *Ephemera*. They are so called because, though they may exist in the larval and pupal

state for several years, in their perfect form they exist only from a few hours to a few days, taking no food, but only propagating their species and then dying.

Day-illy, the popular name for a genus of lilies, natives of temperate Asia and Eastern Europe, two species of which are grown in



Yellow Day-lily.

They have long radical leaves, and gardens. a branched, few-flowered scape, with large handsome blossoms, the segments of which

Dayton, WILLIAM LEWIS (1807-1864), states-man, b. in N. J. He graduated at Princeton in 1825; studied law and began practise in Trenton, N. J., in 1830. He was appointed to the U.S. Senate in 1842 to fill a vacancy, and was re-elected in 1845. In 1856 he was nominated for vice president on the ticket with John C. Fremont. In 1857 he became at-torney general of N. J., and in 1861 was appointed minister to France, which office he held until his death.

Days of Grace are days allowed for the payment of a promissory note or bill of exchange after it becomes due.

Dayton, county seat Montgomery co., O., on the great Miami River, 60 mi. n.e. of Cincinnati. Railroads: P. C. C. St. L. (Pa.); C. H. & D.; C. C. C. & St. L. (Big Four); and Erie. Industries: car works, three factories for the manufacture of agricultural implements, sewing machine, bicycle, refrigerator, pump, linseed oil, and paint factories. Natural gas is pumped from Indiana and the Mercer co. fields. Surrounding country agricultural. First settled in 1796 and became a city in 1805. Dayton celebrated its 100th anniversary in 1896. Three lines of electric cars run to the National Soldiers' Home which is three miles from the center of the city, and embraces over 600 acres of natural and beautiful grounds. Dayton has seven banks, a clearing house, and a number of building and loan associations. Pop. est. 1897, 83,000,

# Deaf and Dumb

Dead-letter, a letter which lies for a certain period uncalled for at the post-office, or one which cannot be delivered from defect of address, and which is sent to the general postoffice to be opened and returned to the writer. Dead-letter office, a department of the general post-office where dead-letters are examined and disposed of.

Dead-nettle, the common name of a species of plants. There are several species found in the U.S. and England as the white dead-nettle, the red, and the yellow.

Dead Reckoning, the calculation of a ship's place at sea without any observation of the heavenly bodies. It is obtained by keeping an account of the distance which the ship has run by the log, and of her course steered by the compass, and by rectifying these data by



White Dead-nettle.

the usual allowance for drift, leeway, etc.,

Dead Sea, called in Scripture "Salt Sea," "Sea of the Plains," and "East Sea," a celebrated lake in Asiatio Turkey, near the south extremity of Palestine, in the pashalio of Damascus. The north extremity is 25 mi. e. of Jerusalem and 10 mi. s.e. of Jericho; length about 46 mi.; breadth at the widest part, 9 to 10; average, about 84 mi. The basin in which the Dead Sea reposes forms the south termination of the great depression through which the Jordan flows, that river entering it at its north extremity. It receives several other tributaries, but has no outlet. The surface is tributaries, but has no outlet. 1,312 ft. below the level of the Mediterranean. It lies deeply imbedded between lofty cliffs of naked limestone, its shores presenting a scene of indescribable desolation and solitude, encompassed by desert sands, and bleak, stony, salt hills. Sulphur and rock salt, lava and pumice abound along its shores. The water is nauseous to the taste and smell, and so buoyant that the human body will not sink in it. At about a third of its length from the north end it attains a maximum depth of 1,308 ft. The southern portion is a mere lagoon, 12 ft. deep in the middle and 3 at the edges.

Deaf and Dumb (or Deaf-mutes), persons both deaf and dumb, the dumbness resulting from deafness which has either existed from birth or from a very early period of life. Such persons are unable to speak simply because they have not the guidance of the sense of hearing to enable them to imitate sounds. Among the causes assigned for congenital deafness are consanguineous marriages, hereditary transmission, scrofula, certain local or climatic conditions, ill health of the mother

during pregnancy, etc. Acquired or accidental deafness, which occurs at all ages, is frequently due to such diseases as smallpox, measles, typhus, paralysis, hydrocephalus, and other cerebral affections, but more particularly to scarlet fever, which is somewhat apt to leave the patient deaf owing to the inflammatory state of the throat extending to the internal ear, and thus causing suppuration and destruction of the extremely delicate parts of the auditory apparatus. In the greater proportion of deaf-mutes no defect is visible, or can be detected by anatomical examination, and no applications yet discovered appear to be useful. The necessity of communication, and the want of words, oblige the deaf-mute to observe and imitate the actions and expressions which accompany various states of mind and of feeling, to indicate objects by their appearance and use, and persons by some peculiar mark, and to describe their actions by direct imitation. In this way he and his friends are led to form a dialect of that universal language of attitude, gesture, and expression which becomes a substitute for words in the hands of the pantomimic actor, and which adds force and clearness to the finest effusions of the orator; in other words, the natural sign language. This language, in its elements, is to be found among all nations, and has ever been the medium of communication between voyagers and the natives of newly discovered countries. It is employed by many savage tribes to supply the paucity of expression in their language and to communicate with other tribes. Among some of the Indians it exists as a highly-organized language. Such a means of communication is after all very imperfect, however, and various more perfect systems have been devised to enable deaf-mutes to communicate with one another and with the rest of mankind, and thus to gain such an education as people in general possess. In 1648 John Bulwer published the earliest work in English on the instruction of the deaf and dumb. In 1743 the practicability of instructing deaf-mutes was first publicly demonstrated in France by Pereira, a Spaniard, before the Academy of Sciences, which gave its testimony to the success of the About the same time the Abbé de method. l'Epée, who devoted his life and fortune to this subject, introduced a system for the instruction of the deaf and dumb, which was taught with great success in the Royal Parisian Institution, and afterward still further developed by his pupil and successor, the Abbé Sicard. In 1779 a public institution for the education of deaf-mutes was established at Leipsic, through the labors of Samuel Hein-icke, the great upholder of the vocal or articulatory system, which is still retained at Vienna and throughout Germany. The first public institution in Great Britain for the gratuitous education of the deaf and dumb was founded at Bermondsey in 1792. From this establishment originated the London Asylum in Kent Road, which was opened in 1807. American institutions have munificent state

endowments and are admirably managed. Deaf-mutes are "the wards of the commonwealth" and every state in the Union provides for its own, either by establishing schools or by appropriations to schools already estab-lished in other states. The Asylum at Hart-ford, Conn., was founded in 1817. This was the first school for the instruction of deafmutes opened in this country. In 1819 this institution received a grant of government land which now yields a fund of over \$300,000. The second school was opened in New York City in 1818. Since that time many institutions have sprung up in other states. The Clarke Iustitute at Northampton, Mass., for instructing deaf-mutes was organized in 1867. It differed from other American institutions in that pupils were received at the legal school age, instead of later, and instructed by articulation and lip-reading, a method borrowed from the Germans. At a conference of instructors in Washington a resolution was passed recommending the use of articulation and lip-reading in connection with the manual method in all the schools in the U.S. The two systems are now combined in nearly all the schools throughout the country. The U. S. has a Na-tional College located at Washington. The American Annals of the Deaf and Dumb has been published since 1847, and conventions of instructors have been held since 1850. The two chief methods of conveying instruction to the deaf and dumb are by means of the manual alphabet, and by training them to



Two-handed alphabet.

watch the lips of the teacher during articula-There are two kinds of manual alphation. bet: the double-handed alphabet, where the letters are expressed by the disposition of the fingers of both hands; and the single-handed, in which the letters are formed with the fingers of one hand. Particular gestures which are attached to each word as its distinctive sign are largely used, as are also real objects and models, pictures, etc. The method of teaching by articulation, the pupil learning to recognize words, and in time to utter them, by closely watching the motions of the lips and tongue in speech, and by being instructed through diagrams as to the different positions of the vocal organs, is now receiving much attention, and has given excellent results, cases being known where persons have conversed with the deaf and dumb and remained ignorant that those to whom they were speaking were afflicted in this way. It is by no means a novel system, but of late it has vastly increased in favor with authorities. A new mode of teaching articulation has recently been brought into notice, consisting in the use of the system of visible speech. The characters of the alphabet on which this system is founded are intended to reveal to the eye the position of the vocal organs in the formation of any sound which the human mouth can utter. Its practical value as a means of instruction with all classes of the deaf and dumb has not as yet been sufficiently tested.

**Deal**, the division of a piece of timber made by sawing; a board or plank. The name deal is chieffy applied to boards of fir above 7 in. in width and of various lengths exceeding 6 ft. If 7 in. or less wide they are called battens, and when under 6 ft. long they are called battens, and when under 6 ft. long they are called dealends. The usual thickness is 3 in., and width 9 in. The standard size, to which other sizes may be reduced, is  $1\frac{1}{2}$  in. thick, 11 in. broad, and 12 ft. long. Whole deal is deal which is  $1\frac{1}{2}$ in. thick; stit deal, half that thickness.

**Deal-fish**, so called from its excessively compressed body, a denizen of the northern ocean and an occasional visitor to the coasts of Iceland, Norway, and Britain; measures from 4 to 8 ft. in length, is of a silvery color with minute scales, and has the dorsal fin extended along the whole length of the back. It is also known by the Scandinavian name Vaagmaer.

**Deane**, SILAS (1737-1789), b. in Greton, Conn., diplomatist. He graduated at Yale in 1758. In 1768 he was elected to the legislature, and in 1774 to the Continental Congress. He bought the first vessel for the American navy. In 1779 he was discharged from Congress. He died in England.

**Dean Forest,** England, county of Gloucester. It formerly comprised the greater part of the county w. of the Severn, but is now reduced to about 22,000 acres, nearly one half of which is enclosed, and was formerly appropriated for the growth of navy timber, but is now mainly covered with coppices. This district is crown property, and the inhabitants enjoy many ancient privileges. It contains a population of nearly 25,000.

# Debenture

Dearborn, HENRY (1751-1829), soldier. He served in Colonel Stark's regiment, took part in the battle of Bunker Hill, and accompanied Arnold to Quebec, where he was captured. He was released on parole in 1776, and exchanged in 1777. He served in General Gates's army; took part in the battle of Monmouth; served in Sullivan's expedition against the Indians in 1779; was with the army in N. J. in 1780; and accompanied General Washington to Yorktown. After the war Washington appointed him marshal of the district of Maine. In 1793, he was elected to Congress, and served two terms. He was secretary of war from 1801 till 1809, when he was made collector of the port of Boston. In 1812 he was made senior major general of the U. S. army. In 1813 he went with his army to Canada and captured York and took Fort George. In 1813 he was placed in command of the military district of New York City. From 1822 till 1824 was minister to Portugal.

**Death's-head Moth,** one of the largest species of lepidopterous insects. The markings upon the back of the thorax very closely resemble a skull, or death's-head. It measures from 4 to 5 inches in expanse. It emits



Death's-head Moth and Caterpiliar.

peculiar sounds, somewhat resembling the squeaking of a mouse, but how these are produced naturalists have not been able satisfactorily to explain. It attacks bee-hives, pillages the honey, and disperses the inhabitants.

**Deathwatch**, a coleopterous insect that inhabits the woodwork of houses. In calling to one another they make a peculiar ticking sound, which superstition has interpreted as a forerunner of death.

**Deben' ture**, a declaratory deed given by a public company in acknowledgment of borrowed money. It gives the holder the first claim for dividends, while the capital sum lent is usually assured on the security of the whole undertaking. With the deed, coupons or war-

#### Deborah

rants for the payment of interest at specified dates are generally issued.

**Deb'orah**, a Hebrew seer or prophetess who lived in the time of the judges; by the aid of Barak delivered the northern tribes from the oppression of Jabin, and secured a peace of 40 years' duration.

**Debra Tabor**, a town in Abyssinia, about 35 mi. e. of Lake Dembea, the residence of the Abyssinian sovereign.

**Debreczin** (de-bret'sin), a town of Hungary, on the edge of the great central plain, 113 mi. e. of Budapest. Its houses are mostly of a single story; the streets broad and unpaved. Among the principal edifices are the Protestant church and college. Chief manufactures are coarse woolens, leather, soap, tobacco pipes, casks, etc., and a large trade is done in cattle. Pop. 56,940.

Debt, National. See National Debt.

**Decalogue** (dek'a-log) (Gr. deka, ten, and logos a word), the ten commandments, which according to Exodus 20 and Deuteronomy 5 were given by God to Moses on two tables. The Jews call them the ten words. Jews and Christians have divided the ten commandments differently; and in some Catholic catechisms the second commandment has been united with the first, and the tenth has been divided into two.

**De Candolle** (dé'kän-dol), AUGUSTIN PYRAME (1778-1841), one of the most illustrious of modern botanists, whose natural system of classification, with some modifications, is the one still generally used, was b. at Geneva. In 1808 he obtained the chair of botany in the faculty of medicine at the University of Montpellier. In 1816 he went to Geneva, where a chair of natural history was expressly created for him, and where he continued for many years to extend the boundaries of his favorite science by his lectures and publications.

**Decap'oda.** 1. The highest order of crustaceans, so called from having five pairs of legs. They are subdivided into the short-tailed decapods or crabs; long-tailed, including the shrimp, lobster, prawn, crayfish, etc.; and Anomura, of which the hermit-crab is an example. 2, One of the two divisions of the dibranchiate cuttlefishes. They have two arms longer than the other eight, and bear the suctorial discs only at the extremities.

**Decatur**, Macon co., Ill., on Sangamon River. Railroads: Illinois Central; Wabash; and three other lines. Industries: flour mills, furniture, linseed oil and cotton factories, farming implements, carriage and iron works. There are coal mines in the vicinity. Pop. est. 1897, 18,-000.

**Decatur**, STEPHEN (1779-1820), b. in Sinnepuxent, Md.; naval officer. In 1790 he became a lieutenant, and in 1801 sailed in the *Essex* to Tripoli. In 1803, he was given command of the *Enterprise*. In 1812, while commander of the frigate United States, he encountered the British frigate Macedonian, and captured her. On his way to sea through Long Island Sound, in 1813, Decatur's vessel was blockaded by the British fleet, and he was driven into New Lon-

## Declination

don. In 1815, he was sent with a squadron of nine vessels to the Mediterranean, where he captured an Algerine frigate. On June 28, he captured a second vessel, and anchoring his squadron in the harbor of Algiers, compelled the dey to negotiate a treaty. He then entered Tunis and Tripoli, forced the release of the American prisoners, and obtained satisfaction for past offenses. Returning to the U. S., he was made a naval commissioner. His death was caused by a wound received in a duel with Commodore Barron, near Bladensburg, D. C.

Dec' can, a term locally limited to the territory of Hindustan lying between the Nerbudda and the Kistna, but generally understood to include the whole country south of the Vindhya Mountains, thus comprising the presidency of Madras and part of Bombay, Hyderabad, Mysore, Travancore, and other native states.

**Decem** ber, the twelfth month of our year. from the Latin *decem*, ten, because in the Roman year instituted by Romulus it constituted the tenth month, the year beginning with March. In December the sun enters the tropic of Capricorn, and passes the winter solstice.

**Decem' virs**, the ten magistrates who had absolute authority in ancient Rome (B.C. 451-449).

**Decid' uous** is a term applied in botany to various organs of plants, particularly leaves, to indicate their annual fall. A tree of which the leaves fall annually is called a deciduous tree, and the same term is applied to the leaves themselves. The term is also applied in zoology to parts which fall off at a certain stage of an animal's existence, as the hair, horns, and teeth of certain animals.

Declaration of Independence, the solemn declaration of the Congress of the U.S.A., on July 4, 1776, by which they formally renounced their subjection to the government of Britain. (For text see U. S.) Declaration of Paris, an instrument signed at the Congress of Paris. 1856, and subsequently accepted by the chief powers. It declared: 1, privateering to be abolished; 2, a neutral flag covers enemy's goods. with the exception of contraband of war; 3. neutral goods, except contraband of war, are not liable to capture under an enemy's flag: and 4, blockades, in order to be binding, must be effective. Declaration of War, the formal notice which, by the usage of nations, belligerents are expected to give before commencing hostilities.

**Declination**, in astronomy, the distance of a heavenly body from the celestial equator (equinoctial), measured on a great circle passing through the pole and also through the body. It is said to be north or south according as the body is north or south of the equator. Great circles passing through the poles, and cutting the equator at right angles, are called *circles of declination*. Twenty-four circles of declination, dividing the equator into twenty-four arcs of  $15^{\circ}$  each, are called hour circles or horary eircles. Declination of the compass or needle.

## Declinometer

or magnetic declination, is the variation of the magnetic needle from the true meridian of a place. This is different at different places, and at the same place at different times.

Declinom' eter, an instrument for determining the magnetic declination, and for observing its variations. In magnetic observatories there are permanent instruments of this kind, and they are now commonly made self-registering. Such instruments register the small hourly and annual variations in declination, and also the variations due to magnetic storms.

**Decomposition**, Chemical, is the separation of the constituents of a body from one another. Roughly speaking—for it is a difference of degree rather than of kind-decomposition is Artificial deeither artificial or spontaneous. composition is produced in bodies by the action of heat, light, electricity, or chemical re-agents; spontaneous, in bodies which quickly undergo change in ordinary circumstances, unless special precautions are taken to preserve them. The bodies of the mineral, and the definite crystallized principles of the organic world, belong to the first; organized matter, such as animal and vegetable tissues, organic fluids, such as blood, milk, bile, and the complex non-crystallized bodies, albumen, gelatin, emulsine, etc., belong to the second.

Dec'orated Style, in architecture, the second style of pointed (Gothic) architecture, in use in Great Britain from the end of the thirteenth to the beginning of the fifteenth century. when it passed into the Perpendicular. It is distinguished from the Early English, from which it was

developed, by the more Column, Fourteenth flowing or wavy lines of its Century.

tracery, especially of its windows, by the more graceful combinations of its foliage, by the

greater richness of the decorations of the capitals of its columns, and of the moldings of its doorways and niches, finials, etc., and generally by a style of ornamentation more profuse and naturalistic. though perhaps somewhat florid. The most distinctive ornament of the style is the ball flower, which 🚚 is usually inserted in a hollow molding. The decorated style has been divided into two periods; viz.,



Window, Oxfordshire, 1300.

the Early or Geometrical Decorated period, in which geometrical figures are largely introduced in the ornamentation; and the Decorated style proper, in which the peculiar characteristics of the style are exhibited. To this latter period belong some of the finest monuments of British architecture.

Decoration Day. The custom of decorating the graves of fallen soldiers originated in the South, where, for several years after the late Civil War, it was observed with reverence and devotion, and with befitting public exercises. The practise was also followed privately in the North for some years after the close of the war; but in 1868 General Logan then commanding the Grand Army of the Republic, by the following official order, made the observance a national one, declaring it to be his "purpose to inaugurate this observance with the hope that it may be kept up from year to year:"

"The 30th of May, 1868, is designated for the purpose of strewing with flowers or otherwise decorating the graves of comrades who died in defense of their country during the late Rebellion, and whose bodies now lie buried in almost every city, village, hamlet, and churchyard in the land. In this observance no form of ceremony is prescribed, but posts and comrades will in their own way arrange such fitting services and testimonials of respect as cirumstances will permit. "JOHN A. LOGAN,

" Commander-in-Chief G. A. R."

Since the issuance of this order the observance of the day thus set apart has constantly increased throughout the country. At first the occasion was called *Memorial Day*, but Decoration Day is now the appellation gener-ally adopted. Originally different days were observed by different states, notwithstanding the day fixed in General Logan's order; but the 30th of May has now been universally settled upon, and in most of the states, North as well as South, it is made a legal holiday. Of all national observances connected with public events in American history, this appropriate and beautiful custom appears to have taken the deepest hold in the popular heart.

Decoy', a place into which wild fowls are decoyed in order to be caught. A decoy pond is kept only in a secluded situation. Several channels or pipes of a curved form, covered with light, hooped network, lead from the pond in various directions. The wild fowl are enticed to enter the wide mouth of the channel by tamed ducks, also called decoys, trained for the purpose, or by grain scattered on the water. When they have got well into the covered channel they are surprised by the decoyman and his dog, and driven up into the funnel net, at the far end where they are easily caught. The details differ in different cases. but this is the general principle of the contrivance.

Decrepita tion, the act of flying asunder with a crackling noise, on being heated, or the crackling noise, attended with the flying asunder of their parts, made by several salts and

42

minerals when heated. It is caused by the unequal sudden expansion of their substance by the heat, or by the expansion and volatilization of water held mechanically within.

**Dedham,** Norfolk co., Mass., on the Charles River. Railroads: N. Y. N. H. & H. and N. Y. & N. E. Industries: broom, woolen, suspender manufactories, cocoa and chocolate establishments, and piano Works. Pop. est. 1897, 7,500.

Dee, the name of several British rivers. 1, A river of Scotland, partly in Kincardineshire, but chiefly in Aberdeenshire, one of the most finely wooded and one of the best salmon rivers in Britain. 2, A river of North Wales and Cheshire; rises in Lake Bala, Merionethshire; flows to the Irish Sea, 20 mi. below Chester. 3, A river of Scotland, county of Kirkcudbright, rises in Loch Dee, flows s.e. and s., and falls into Kirkcudbright Bay.

Dee, JOHN (1527-1608), English mathematician, alchemist, and astrologer. In the reign of Mary he was imprisoned on suspicion of practising the "black art;" but was in favor with Elizabeth, who is said to have employed him on secret political missions, and paid him a fixed salary. In 1581 he visited several of the Continental courts, pretending to raise spirits. In 1595 he obtained from the queen the wardenship of Manchester College.

Deed, in law, a writing containing some contract or agreement, and the evidence of its execution made between parties legally capable of entering into a contract or agreement; particularly an instrument on paper or parchment, conveying real estate to a purchaser or donee. It is either an *indenture* or a *deed-poll*; the former made between two or more persons in different interests, the latter made by a single person, or by two or more persons having similar interests.

Deer, a general name for the ungulate or hoofed ruminating animals constituting the family Cervidæ, of which the typical genus is *Cervus*, the stag or red deer. The distinguishing characteristics of the genus are, that the members of it have solid, branching horns which they shed every year, and eight cutting teeth in the lower jaw and none in the upper. The horns or antiers always exist on the head of the male, and sometimes on that of the female. The forms of the horns are various; sometimes they spread into broad palms which send out sharp snags around their outer edges; sometimes they divide very fantastically into branches, some of which project over the forehead, while others are reared upward in the air; or they may be so reclined backward that the animal seems almost forced to carry its head in a stiff, erect posture. They are used as defensive and offensive weapons, and grow with great rapidity. There are many species of deer, as the red deer or stag, the fallow deer, the roebuck, the reindeer, the moose, the elk, the axis, rusa, muntjac, wapiti, etc. Deer are pretty widely distributed over the world, though there are none in Australia and few in Africa, where the antelopes take their place. The reindeer alone has been domesticated.

Deering, Cumberland co., Me., on Casco Bay. Railroads: Maine Central; Grand Trunk; Portland & Rochester. Industries: lumber and manufactures. Pop. est. 1897, 6,200.

Deer mouse, the common name of the animals belonging to the genus *Meriones*, an American genus of rodent animals allied to the mice and the jerboas of the Old World. The deer mouse of Canada is a pretty little animal of the size of a mouse, with very long hind-legs and tail, and very short fore legs.

**Default'**, in law, signifies generally any neglect or omission to do something which ought to be done. Its special application is to the non-appearance of a defendant in court when duly summoned on an appointed day. If he fail to appear judgment may be demanded and given against him by default.

**Defend** ant, in law, the party against whom a complaint, demand, or charge is brought: one who is summoned into court, and defends. denies, or opposes the demand or charge, and maintains his own right. The term is applied even if the party admits the claim.

**Defiance**, Defiance co., O., on Maumee River and Wabash & Erie Canal. Railroads: Baltimore & Ohio, and Wabash lines. Industries: lumber mills and woolen factories. In grain-growing district. Pop. est. 1897, 8,000.

Definition, a brief and precise description of a thing by its properties; an explanation of the signification of a word or term, or of what a word is understood to express. Logicians distinguish definitions into nominal and real. A nominal definition explains the meaning of a term by some equivalent word or expression supposed to be better known. A real definition explains the nature of the thing. A real definition is again accidental, or a description of the accidents, as causes, properties, effects, etc., or essential, which explains the constituent parts of the essence or nature of the thing. An essential definition is, moreover, metaphys ical or logical, defining "by the genus and dif-" as it is called, as, for example, "a ference. plant is an organized being, destitute of sensation," where the part first of the definition states the genus, and the latter the difference: or *physical*, when it distinguishes the physical parts of the essence; thus, a plant is distinguished by the leaves, stalk, root, etc. A strictly accurate definition can be given of only a few objects. The most simple things are the least capable of definition, from the difficulty of finding terms more simple and intelligible than the one to be defined.

**Defoe** (dē-fo'), DANIEL (1661-1731), an English writer of great ingenuity and fertility, was b. in London. In 1701 appeared his satire in verse, *The True-born Englishman*, in favor of William III. In 1716 he published his largest poem, entitled *Jure Divino*, a satire on the doctrine of divine right. In 1707 he was in Scotland. In 1719 appeared the most popular of all his performances, *The Life and Surpring Adventure of Robinson Crusse*. After the accession of George I he was employed by government in some underhand work connected with the obnoxious Jacobite press, and was a prolific

contributor to periodical and ephemeral literature.

Degree', in geometry or trigonometry, the 360th part of the circumference of any circle, the circumference of every circle being supposed to be divided into 360 equal parts, called degrees. A degree of latitude is the 360th part of the earth's circumference north or south of the equator, measured on a great circle at right angles to the equator, and a degree of longitude is the same part of the surface east or west of any given meridian, measured on a circle parallel to the equator. Degrees are marked by a small  $\circ$  near the top of the last figure of the number which expresses them; thus,  $45^{\circ}$  is 45 degrees. The degree is subdivided into sixty equal parts called minutes; and the minute is again subdivided into sixty equal parts called seconds. Thus,  $45^{-12'}$  20'' means 45 degrees, 12 minutes, and 20 seconds. The magnitude or quantity of angles is estimated in degrees and parts of a degree, because equal angles at the center of a circle are subtended by equal arcs, and equal angles at the centers of different circles are subtended by similar arcs; or arcs containing the same number of degrees and parts of a degree. An angle is said to be so many degrees as are contained in the arc of any circle intercepted between the lines which contain the angle, the angular point being the center of the circle. Thus we say an angle of  $90^{\circ}$ , or of  $45^{\circ}$  24'. It is also usual to say that a star is elevated so many degrees above the horizon, or declines so many degrees from the equator, or such a town is situated in so many degrees of latitude or longitude. The length of a degree depends upon the radius of the circle of the circumference of which it is a part, the length being greater the greater the length of the radius. Hence the length of a degree of longitude is greatest at the equator, and diminishes continually toward the poles, at which it = 0. Under the equator a degree of longitude contains 60 geographical, and 691 statute miles. The degrees of latitude are found to increase in length from the equator to the poles, owing to the figure of the earth. Numerous measurements have been made in order to determine accurately the length of degrees of latitude and longitude at different parts of the earth's surface and thus settle its dimensions and magnitude. When the French determined to establish their system of measures and weights based upon the meter, they settled that this basis was to be the ten-millionth part of the distance from the equator to the pole, which distance had to be found by accurate measurement. Ten degrees of latitude were accordingly measured, from Dunkirk to Formentera, one of the Balearic Islands. Similar measurements having been made in Britain, the length of a total arc of twenty degrees has been found. Many measurements have also been made elsewhere. The term is also applied to the divisions, spaces, or intervals marked on a mathematical, meteorological, or other instrument, as a thermometer or barometer.

Degree, in universities, a mark of distinc-

tion conferred on students, members, or distinguished strangers, as a testimony of their proficiency in the arts or sciences, or as a mark of respect, the former known as ordinary, the latter as honorary degrees. The degrees are bachelor, master, and doctor, and are conferred in arts, science, medicine, divinity, and music.

**De Haas,** MAURICE FREDERICK HENDRICK (1832-), painter, b. in Rotterdam, Holland. He studied at the Academy of Fine Arts; in 1857 was made artist of the Holland navy, and in 1859 became located in New York City. His best known American work is *Farragut Passing the Forts*. He became an academician of the national academy in 1867, and was one of the original members of the American society of painters in water colors.

De ism, a philosophical system which, as opposed to Atheism, recognizes a great first cause: as opposed to Pantheism, a Supreme Being distinct from nature or the universe; while as opposed to Theism, it looks upon God as wholly apart from the concerns of this world. It thus implies a disbelief in revelation, scepticism as regards the value of miraculous evidence, and an assumption that the light of nature and reason are the only guides in dootrine and practise. It is thus a phase of Rationalism. In the last century there were a series of writers who are spoken of distinctively as the English deists. They include Collins, Toland, Tindal, etc.

De Kaib, JOHN (1721-1780), baron, a general in the American army of the Revolution, b. in Alsace. He was a brigadier in the French service, and in 1777 accompanied Lafayette to America. Congress appointed him a major general, and he served in New Jersey and Maryland, was second in command under General Gates, and was mortally wounded at Camden.

**De Koven**, REGINALD, American composer, b. 1859 at Middletown, Conn. He studied at Stuttgart and Paris, and later attended Oxford University, where he graduated in 1879. He devoted himself to composition, and produced several popular operas and songs, among which are Margery Daw. O Promise Me, Winter's Lullaby, and Ask What Thou Wilt. His operas are, Robia Hood, Don Quirote, The Fencing Master, Rob Roy, and The Mandarin. He is at present musical critic of the New York World.

**Delago'a Bay,** in Southeast Africa, a large sheet of water separated from the Indian Ocean by the peninsula and island of Inyack. The bay stretches north and south upward of 40 mi., with a breadth of from 16 to 20 mi., and forms the southern extremity of the Portuguese settlement of Mozambique. It is available for vessels of large tonnage, though the presence of shoals, banks, and flats renders the navigation of the bay somewhat intricate. The port and Portuguese settlement of Lourengo Marques is becoming a place of considerable trade since the opening of gold mines in the Transvaal. A railway running toward the Transvaal has been opened for a distance of over 50 mi.

De Lancey, JAMES (1703-1760), colonial chief justice, b. in New York City. In 1731 he became second judge of the supreme court. In 1730 he framed the Montgomery charter of the city. In 1733 he succeeded to the chief judgeship, which he retained throughout life. In 1753, he became lieutenant governor of New York, and in 1754 presided over the first Congress convened in the country, held to conciliate the Indians. In May, 1755, he granted the charter of Columbia College. When Governor Hardy arrived in September, 1755, the lieutenant governor resumed his functions on the bench. Two years later Governor Hardy sailed in command of an expedition against Louisburg, leaving Judge De Lancey again governor of the province.

**Delano,** COLUMBUS (1809-), statesman, b. in Shoreham, Vt., removed to Ohio in 1817, practised law, and was elected to Congress in 1844 and again in 1864 and 1866. In November, 1870, he became secretary of the interior, and held office until October, 1875.

**De la Ramee**, LOUISA, known to the literary world as "Ouida," was b. in England in 1840. Her novels, though full of incident, are disfigured by extravagance of language.

Delaroche (dé-la-rosh), Hippolyte (familiarly styled Paul) (1797-1856), probably the greatest painter of the French school. He studied landscape painting for a short time, but applied himself afterward to historical painting, and rapidly rose to eminence. His subjects are principally taken from French and English history. Among others may be men-tioned: St. Vincent de Paul Preaching Before Louis XIII on behalf of Deserted Children; Joan of Arc Interrogated in Prison by Cardinal Beaufort; A Scene of the St. Bartholomew Massacre; The Children of Edward IV in the Tower; etc. His merits consist in correct drawing, appropriate expression, harmonious color, and great distinctness and perspicuity in treatment, rendering the story of his pictures at once intelligible.

**Delaware**, a river of the U. S. which rises in Catskill Mountains in New York, separates Pennsylvania from New York and New Jersey, and New Jersey from Delaware, and loses itself in Delaware Bay. It has a course of about 300 mi., and is navigable for large vessels to Philadelphia, and for smaller craft to the head of tide water at Trenton (155 mi.).

**Delaware**, one of the original thirteen states, and, next to Rhode Island, the smallest state in the Union. named after Lord Delaware, one of the early governors of Virginia. It is bounded north by Pennsylvania, east by the Delaware River and Bay and by the ocean, south and west by Maryland; area 2.050 sq. mi. It is divided into three counties, Kent, Newcastle, and Sussex, and has nearly the form of a right-augled triangle (hence its popular name "the diamond state"). Its rivers are small and unimportant, and most of them flow into the Delaware Bay or River. The Delaware and

Chesapeake Canal connects the two great bays. and makes an easy water transit for produce between Philadelphia and Baltimore. Save in a small hilly section in the north, nearly all the surface is low and level, and in the extreme south there is much swampy land; while the most southern two fifths of the area is in great part a sandy region. The hill district in the north presents a stony surface overlying azoic rocks, such as gneiss and granite, with patches of serpentine and limestone. A strip of highly fertile red clay lies south of the hill country: and next southward occurs a productive and fossiliferous greensand formation, succeeded by a somewhat sandy belt, less fertile than the greensand, although the greater part of its extent is by no means unproductive. The coast region has many salt marshes, some of them dyked, and thus rendered tillable; and farther inland is a considerable body of extremely rich alluvial soil. The western border of the state is generally well wooded, and in some places flat and marshy. In the north kaolin and iron ore are found, and bog ore or limonite occurs to some extent in other parts.

Climate.—The climate is mild and healthful except in the southern part, where the swamps occasion some fevers. The range of temperature in winter is from 30 to 38 degrees, and in summer from 69 to 74. The average rainfall is about 49 in.

Vegetation.—Fruit growing is the principal agricultural industry. Great quantities of peaches, apples, and small fruit are raised and sold in Philadelphia and New York. The cereals are wheat, corn, rye, oats, barley, buckwheat, flax, hops, tobacco, peas, beans, clover seed, and flax seed. In the swampy districts there are great forests of cypress and other evergreen trees, and in the semi-tropical regions are large quantities of bog oak, hackmatack, etc.

Manufactures.—In manufacturing Delaware ranks thirty-fifth in the Union. Among the manufactories are cotton, paper, and carriages. Iron shipbuilding is also carried on in the state. There are rolling mills, woolen factories and flouring mills. There are several railroads. having a total mileage of 350 mi.

Education.—There are two colleges in the state, Delaware College at Newark, and Wesleyan Female College at Wilmington. The public school education is thorough throughout the state. The state provides for the purchase of free text-books. The state institutions are a state hospital for the insane, industrial school for boys and girls, deaf, dumb, and blind institutions, etc.

History. – Delaware was one of the original thirteen states of the Union. It was first settled by Swedes and Finns in 1638; in 1655 it passed into the hands of the Dutch; in 1664 it passed with New York into the hands of the English; in 1682 Wm. Penn became proprietor of the Delaware counties. Delaware was a slave state until the Civil War, but took no part in the secession movement. The principal cities are Wilmington, Dover (the capital), and New Castle. The pop. of the state is about 170,000. The popular name is the Blue Hen State.

Governors.—Joshua Clayton, 1796-98; Gunning Bedford, 1706-97; Daniel Rogers, 1797-98; Richard Bassett, 1798-1801; James Sykes, 1801-02; David Hall, 1802-05; Nathaniel Mitchell, 1805-08; George Truett, 1808-11; Joseph Haslett, 1811-14; Daniel -Rodney, 1814-17; John Clarke, 1817-20; Jacob Stout, 1820-21; John Collins, 1821-22; Caleb Rodney, 1822-23; Joseph Haslett, 1823-24; Samuel Paynter, 1824-27; Charles Polk, 1827-30; David Hazzard, 1830-33; Caleb P. Bennett, 1833-36; Charles Polk, 1836-37; Cornelius P. Comegys, 1837-40; Wm. B. Cooper, 1840-44; Thomas Stockton, 1844-46; Joseph Maul, 1846; Wm. Temple, 1846-47; Wm. Thorp, 1847-51; Wm. H. Ross, 1851-55; Peter F. Cansey, 1853-59; Wm. Burton, 1859-63; Wm. Cannon, 1863-67; Gove Saulsbury, 1867-71; James Ponder, 1871-75; John P. Cochran, 1875-79; John W. Hall, 1870-83; Chas. C. Stockley, 1888-87; Benjamin T. Biggs, 1887-01; R. J. Reynolds, 1801-05; J. H. Marvil (d. April 8), 1805; W. P. Watson, 1805-97; E. W. Tunnell, 1897.

Delaware, Delaware co., O. Railroads: Columbus, Hocking Valley & Toledo, and C. C. C. & St. L. Industries: chair, castiron, furniture factories, woolen mills, and carriage shops. Seat of Ohio Wesleyan University. Pop. est. 1897, 8,500.

**Delaware Bay**, an estuary or arm of the sea between the states of Delaware and New Jersey. At the entrance, near Cape Henlopen, is situated the Delaware Breakwater, which affords vessels a shelter within the cape. It was erected by the Federal government, and cost about \$3,000.000.

Delaware Indians, a tribe belonging to the Algonquin family, originally known as living on the Delaware River, and called by themselves *Lenni Lenape*. They had to leave their original settlements about the middle of last century, going farther west, and latterly they were removed to the Indian Territory. Their numbers are now insignificant.

**Delft** (formerly Delf), a town, Holland, 8 mi. n. w. Rotterdam, intersected in all directions by canals. Among its buildings are the townhall, the Prinsen-hof, the scene of the assassination of William the Silent, now a military barrack; the old Reformed church, containing the monuments of Admiral Tromp, the naturalist Leeuwenhoek, etc.; the new church, containing monuments to William I, Hugo Grotius, and the burial vaults of the present royal family. Pop. 27, 131. **Delhi** (del'i), a city of Hindustan, in the

Delhi (del'1), a city of Hindustan, in the Punjab, anciently capital of the Patan and Mogul empires, about 954 mi. n.w. Calcutta. It was at one time the largest city in Hindustan. A vast tract, covered with the ruins of palaces, pavilions, baths, gardens, mausoleums, etc., marks the extent of the ancient metropolis. The present city abuts on the right bank of the Jumna, and is surrounded on three sides by a lofty stone wall. The palace or residence of the Great Mogul, built by Shah Jehan, commenced in 1631, and now known as "the fort," is situated in the east of the city, and abuts directly on the river. It is surrounded on three sides by an embattled wall of reddish sandstone nearly 60 ft. high, with round towers at intervals, and a gateway on the west and south. Since the mutiny of 1857 a great portion has been demolished in order to make room for military barracks. One of the most remarkable objects in the city is the Jamma Musjid or Great Mosque, a magnificent structure in the Byzantine-Arabic style, built by the Emperor Shah Jehan in the seventeenth century. Among modern buildings are the government college, founded in 1792, the Residency, and a Protestant church. Pop. 193,580.

Delir' ium Tre' mens, an affection of the brain which arises from the inordinate and protracted use of ardent spirits. It is therefore almost peculiar to drunkards. The principal symptoms of this disease, as its name imports, are delirium and trembling. The delirium is a constant symptom, but the tremor is not always present, or, if present, is not always perceptible. Frequently the sufferer thinks he sees the most frightful, grotesque, or extraordinary objects, and may thus be put into a state of extreme terror. It is properly a disease of the nervous system.

**Della Robbia**, LUCA (1400-1482), Italian sculptor. He was distinguished for his work both in marble and bronze, and also for his reliefs in terra-cotta coated with enamel, a kind of work named after him.

**Deforme** (de-form), MARION, a celebrated French beauty who reigned under Louis XIII. The date of her birth is stated at 1611, 1612, and 1615. Her beauty and wit soon made her house the rendezvous of all that was gailant and brilliant in Paris. She espoused the side of the Frondeurs, and Mazarin was about to have her arrested when her sudden death terminated her short career of thirty-nine years.

De'los, an island of great renown among the ancient Greeks, fabled to be the birthplace of Apollo. It was a center of his worship, and the site of a famous oracle. It is the central and smallest island of the Cyclades, in the Ægean Sea, a rugged mass of granite about 12 sq. mi. in extent.

sq. mi. in extent. **De Long,** GEORGE WASHINGTON (1844-1881), Arctic explorer; b. in New York City; d. in Siberia, Russia. He was educated in the public schools at Brooklyn. In 1861 he was appointed midshipman at the U. S. Naval Academy, and graduated in 1865. He commanded an exploring expedition to the Arctic regions, which resulted in a number of important discoveries, but which was ill-fated, all but two of the party perishing.

**Delphi**, an ancient Greek town, originally called Pytho, the seat of the famous oracle of Apollo, was situated in Phocis, on the southern side of Parnassus, about 8 mi. n. of the Corinthian Gulf. It was also one of the meetingplaces of the Amphictyonic Council, and near it were held the Pythian games. The oracles were delivered by the mouth of a priestess who was seated on a tripod above a subterranean opening, whence she received the vapors

## Delphos

ascending from beneath, and with them the inspiration of the Delphian god. The oracular replies were always obscure and ambiguous; yet they served, in earlier times, in the hands of the priests, to regulate and uphold the political, civil, and religious relations of Greece. The oracle was celebrated as early as the ninth century B. C., and continued to have importance till long after the Christian cra, being at last abolished by the emperor Theodosius.

Delphos, Allen and Van Wert cos., O., on Miami & Erie Canal, 74 mi. s.w. of Toledo, Railroads: P. Ft. W. & C.; T. St. L. & K. C. (clover leaf route); C. H. & D.; and Northern Ohio. Industries: wheel works, two flouring mills, iron foundry, hoop and stave, hinge coupler, gas engine, and patent fence factories, furniture factory and marble works. Oil and natural gas found in paying quantities. Surrounding country agricultural. The town was first settled in 1834. Pop. est. 1897, 5,000.

Delsarte, FRANÇOIS ALEXANDRE (1811-1871), musician and investigator.b. at Solsme, France. He composed a few melodies and wrote sev-eral romances. He was chiefly known as a teacher of singing and declamation. Many operatic and dramatic celebrities owe their success to his training. At the age of twelve he devised an original method of musical notation. Baurbini was so pleased with his originality that he adopted him. Delsarte sought by an elaborate system to reduce human expression to a science. Some charts represent-His phiing his formulations are extant. losophy has become the basis of culture and criticism. According to Delsarte the trinity is the universal formula of human life, arts, and sciences. Each part of man's three-fold nature has a distinct office to perform and yet is inseparably connected with every other part. The vital forces express themselves by tension, or tone used in the medical sense-that is, power or strength; the mental in words, and The limbs are the emotional by gestures. the primary vital organs; the head is the mental organ and the torso the emotional. All vital movements are from the center; all mental movements toward the center; all normal movements are around the center. Bodily motions should be governed by the laws of opposition, succession, rhythm, force, direction, velocity, and reaction. The Delsarte system has been popularized in the U. S., and its fundamental principles applied to health with excellent results. His influence on plastic, decorative, and dramatic arts has been widely felt. He claimed that every outward manifestation is but the expression of an inner The following rules have been applied state. to the improvement of man's physical condition: 1, Relaxing movements relieve nervous strain and conserve vital energy. 2. Energizing movements increase and direct nervous force. 3, Æsthetic movements produce health. harmonious development, and pleasing expression by harmonizing man's three-fold nature. **Delta**, the name of the Greek letter  $\Delta$ , cor-

responding to the English D. The island

#### Democracy

formed by the alluvial deposits between the mouths of the Nile, from its resemblance to this letter, was named Delta by the Greeks: and the same name has since been extended to those alluvial tracts at the mouths of great rivers which, like the Nile, empty themselves into the sea by two or more diverging branches

**Demand and Supply;** terms used in political economy to express the relations between consumption and production, between the demand of purchasers and the supply of commodities by those who have them to sell. The relations which subsist between the demand for an article and its supply determine its price or exchangeable value. When the demand for a commodity exceeds the supply the price of the commodity is raised, and when the supply exceeds the demand the price falls.

**Demavend** (de-mä'vend), a volcanic mountain of Persia, and the highest peak of the Elbruz chain, 45 mi. s. of the Caspian Sea and about 40 mi. n.e. of Teheran. Its height is about 19,400 ft., and it bears evidence of having been active during the latest geological (if not within the historic) period.

**Dembin'ski**, HENRYK (1791-1864), a Polish general, and leader in the Hungarian revolution of 1849. He served under Napoleon during the Russian campaign of 1812; was governor of Warsaw and commander-in-chief of the Polish army during the revolution of 1830; was appointed by Kossuth commander of the Hungarian troops in 1849, and served till Kossuth's resignation compelled him to seek refuge in France, where he remained till his death.

**Demera'ra** (or Demarara), a division of British Guiana, which derives its name from the river Demerara. It extends about 100 mi. along the coast. lying on the e. of Essequibo and on the w. of Berbice. The soil is very fertile, producing abundant crops of sugar, coffee, cotton, rice, etc. Chief town, Georgetown. Population of province, 125,000. The river, after a course of about 120 mi., flows into the Atlantic.

**Deme'ter**, one of the twelve principal Grecian deities, the great mother goddess, the nourishing and fertilizing principle of nature.

**Demet' rlus** (or Dmitri), the name of a series of impostors who usurped supreme authority in Russia, and led to some of its remarkable revolutions.

**Demi-rilievo** (-ri-li- $\tilde{a}'v\delta$ ), in sculpture, halfrelief, or the condition of a figure when it rises from the plane as if it had been cut in two and only one half fixed to the plane.

**Dem'turge** (Greek, *Demtourgos*, a handicraftsman), a designation applied by Plato and other philosophers to the Divine Being. considered as the Architect or Creator of the universe.

**Democ'racy**, the rule of a people by the people themselves; that form of government in which the sovereignty of the state is vested in the people, and exercised by them either directly, as in the small republics of ancient Greece, or indirectly, by means of representative institutions, as in the constitutional states

of modern times. The term is also applied in a collective sense to the people or populace, especially the populace regarded as rulers.

**Democ' ritus** (b. c. 470-370), a Greek philosopher of the new Eleatic school, a native of Abdëra. He was called "the laughing philosopher," from his habit of laughing at the follies of mankind. In his system he developed the mechanical or atomical theory of his master, Leucippus. Thus he explained the origin of the world by the eternal motion of infinite number of invisible and indivisible bodies or atoms, which differ from one another in form, position, and arrangement, and which have a primary motion, which brings them into contact, and forms innumerable combinations, the result of which is seen in the productions and phenomena of nature.

De'mon (Greek, daimon), a spirit or immaterial being of supernatural but limited powers, especially an evil or malignant spirit. Among the ancient Greeks the name was given to beings similar to those spiritual existences called angels in the Bible. In the New Testament evil spirits are called demons (commonly translated "devils"). A belief in demons is found in the oldest religions of the East.

**Demonstration**, in a logical sense, any mode of connecting a conclusion with its premises, or an effect with its cause. In a more rigorous sense it is applied only to those modes of proof in which the conclusion necessarily follows from the premises. In ordinary language, however, demonstration is often used as synonymous with *proof*.

Demosthenes (-nēz) (B.c. 382-322), the famous ancient Greek orator, was the son of a sword-cutler at Athens. His father left him a considerable fortune, of which his guardians attempted to defraud him. Demosthenes, at the age of seventeen years, conducted a suit against them himself, and gained his cause. He then set himself to study eloquence, and though his lungs were weak, his articulation defective, and his gestures awkward, by perseverance he at length surpassed all other orators in power and grace. He thundered against Philip of Macedon in his orations known as the Philippics, and endeavored to instill into his fellow citizens the hatred which animated his own bosom. He labored to get all the Greeks to combine against the encroachments of Philip, but their want of patriotism and Macedonian gold frustrated his efforts. He was present at the battle of Chæroneia (380 B.C.), in which the Athenians and Bootians were defeated by Philip, and Greek liberty crushed. On the accession of Alexander in 336 Demosthenes tried tostir up a general rising against the Macedonians, but Alexander at once adopted measures of extreme severity, and Athens sued for mercy. It was with difficulty that Demosthenes escaped being delivered up to the conqueror. In 324 he was imprisoned on a false charge of having received a bribe from one of Alexander's generals, but managed to escape into exile. On the death of Alexander next year he was recalled, but the defeat of the

Greeks by Antipater caused him to seek refuge in the temple of Poseidon, in the island of Calauria, on the coast of Greece, where he poisoned himself to escape from the emissaries of Antipater. The character of Demosthenes is by most modern scholars considered almost spotless. His fame as an orator is equal to that of Homer as a poet. Cicero pronounces him to be the most perfect of all orators. He carried Greek prose to a degree of perfection which it never before had reached. Everything in his speeches is natural, vigorous, concise, symmetrical. We have under his name sixty-one orations, some of which are not The great opponent-and indeed genuine. enemy-of Demosthenes as an orator was Æschines.

**Demurr'age,** in maritime law, the time during which a vessel is detained by the freighter, beyond that originally stipulated, in loading or unloading. When a vessel is thus detained she is said to be on demurrage. The name is also given to the compensation which the freighter has to pay for such delay or detention. Demurrage must be paid though it be proved the delay is inevitable; but it cannot be claimed where it arises from detention by an enemy, tempestuous weather, or through the fault of the owner, captain, or crew.

**Demurrer**, in law, a stop at some point in the pleadings, and a resting of the decision of the cause on that point; an issue on matter of law. A demurrer confesses the fact or facts to be true, but denies the sufficiency of the facts in point of law to support the claim or defense.

**Dena'rius**, a Roman silver coin worth 10 asses or 10 lbs. of copper originally, and afterward considered equal to 16 asses. when the weight of the as was reduced to an ounce on account of the scarcity of silver. The *denarius* was equivalent to about 16 cents of our money. There was also a gold denarius equal in value to 25 silver ones.

**Denbigh** (den'bi), a county of North Wales, on the Irish Sca; area, 662 sq. mi., of which about a fourth is arable. There are several beautiful and fertile vales, among the more celebrated of which are the vales of Llangollen. Clwyd, and Conway. Pop. 117,872; capital, Denbigh; pop. 4.507.

Denbigh; pop. 4,507. Denbigh; pop. 4,507. Denis, Sr., a town in France, department of the Seine, 6 mi. n. of Paris. It contains the famous abbey church of St. Denis, a noble Gothic structure in part dating from the eleventh century or earlier, but much has been done in the way of restoration in the present century. St. Denis was the burial place of the kings of France; and all her rulers from Hugh Capet downward, besides some of the earlier dynasties, lay there till 1793, when the revolutionary fury of the convention caused the tombs to be rifled and the church to be denuded.

**Dennison**, Grayson co., Texas. Railroads: M. K. & T.; H. & T. C.; and Texas Pacific. Industries: machine shop, wagon works, planing and grist mills, and bridge works. Coal and iron are within easy reach. The town was
## Denmark

first settled in 1872 and became a city in 1873. Pop. est. 1897, 15,000.

Den'mark, a northern kingdom of Europe, consisting of a peninsular portion called Jutland, and an extensive archipelago lying east of it and comprising the islands of Seeland, Samsö, Lasö, Arrö, Bornholm, and many smaller ones. Besides these there are the outlying possessions of Iceland, Greenland, and the Faroe Islands in the Atlantic Ocean, and Santa Cruz, St. Thomas, and St. John in the West Indies. The area of the home possessions is 15,288 sq. mi., of which Jutland occupies 9,743; pop. 2,185,162. Copenhagen is the capital; other chief towns are Odense, Aarhuus, Aalborg, Randers, and Horsens. Denmark is divided into eighteen provinces or districts, besides the capital, nine of these making up Jutland, while the others embrace the islands. Denmark, whether insular or mainland, is a very low-lying country, the eastern side of Jutland, where the highest elevation occurs, not exceeding 550 ft. All the rocks be-long to the upper series of the secondary and to the tertiary formation. The rock most fully developed is the chalk, above which is an extensive boulder formation containing seams of lignite. Above this are thick beds of clay and marl. Where this prevails, as in Seeland and the east of Jutland, the soil is generally fertile; but where it is overlaid with deep beds of sand, as in the north and west of Jutland, the aspect is extremely desolate. Nearly the whole west coast, indeed, is rendered almost uninhabitable by the drift sand, which has formed an almost uninterrupted line of sterile downs called Klitten, extending from Cape Skagen (or The Skaw) to Blaavands Hook. A large portion of Jutland consists of heathy or moory land, com-paratively unprofitable. Elsewhere it exhibits a fertile, undulating surface. The islands, especially Seeland and Funen, are fertile and present many landscape beauties. Woods of some extent exist, especially in the islands. In earliest prehistoric times the Scotch fir was the prevailing tree, and subsequently the oak. The principal tree now is the beech. The elm, ash, willow, aspen, and birch are met with in small numbers. Pine forests have been planted in the north of Jutland and elsewhere. Denmark has numerous streams but no large rivers: the principal is the Guden, which flows northeast through Jutland into the Cattegat. It is navigable for part of its course. The lakes are very numerous but not large, none exceeding 54 mi. in length by about 14 mi. broad. There are numerous winding inlets of the sea that penetrate far into the land. The largest of these, the Liimford, in Jutland, entering from the Cattegat by a narrow channel, winds its way through to the North Sca, thus making Northern Jutland really an island. Intercourse between the various islands and parts of the kingdom, separated from each other by water, is well kept up by ferries, etc., and the country is well supplied with railways, both in Jutland and the islands. Copenhagen, Aalborg, Aarhuns, and Randers are the chief seaports. Ow-

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## Denmark

ing to the lowness of the land and its proximity to the sea on all sides, the climate is remarkably temperate for so northerly a region, though the thermometer in winter may sink to 22- below zero, and in summer rise to 89<sup>-2</sup>. Violent winds are frequent, and rains and fogs preva-lent. The agricultural land is greatly subdivided, as the law interdicts the union of small farms into larger. Among crops the greatest area is occupied by oats, which are grown all over the country, but best in Jutland. Barley is grown chiefly in Seeland, and is largely used in brewing beer, the common beverage of the country. Rye is extensively raised. Turnips, beans, peas, flax, hemp, hops, tobacco, etc.. are also grown; but in general, cattle breeding. grazing, and the dairy take up most of the farmer's attention in Denmark. The old Danish breed of horses found chiefly in Jutland, has long been famous for strength, symmetry. docility, and bottom. The herring, turbot, torsk, and salmon are the most abundant. Paper, gloves, the woolens, and earthenware of Jutland, the wooden clocks of Bornholm, are the chief manufactures. There are also iron foundries, sugar refineries, some extensive tanneries, and many distilleries. The commerce of Denmark is carried on chiefly with Great Britain, Germany, Norway, Sweden, and Russia-Germany possessing the largest share. The value of imports has in recent years varied between \$65,000,000 and \$80,000,000. The chief imports are textile manufactures, metal goods. coal, timber, oil, coffee, sugar, tobacco, fruit, etc. The chief exports are cattle, horses, and swine, butter (a most important item), bacon. hides, flour, eggs, and other edibles. Much of the butter and other agricultural produce goes to Britain. In 1895 the mercantile marine had a total tonnage of about 330,033 tons. The railways have a length of about 1,407 mi. Since 1875 the unit of the Danish monetary system has been the krone, or crown. The krone is divided into 100 öre.

The population of Denmark is composed almost exclusively of Danes, with a few thou-sand Jews and others. The Danes have regular features, fair or brownish hair, and blue eyes. They still maintain their reputation for seafaring skill and hospitable customs. They are almost exclusively Lutherans in religion, but unlimited toleration is extended to all faiths. Jews, however, though themselves electors. cannot be elected as representatives. At the head of the educational institutions stand the University of Copenhagen and the Holberg Academy at Soröe. The provinces are well supplied with gymnasia and middle schools. and primary instruction is given at the public expense in the parochial schools. It is rare to meet a peasant who cannot read and write. even among the poorer class.

The government of Denmark was originally an elective monarchy. In 1661 it became a hereditary and absolute monarchy, and in 1849 a hereditary constitutional one, the legislative power being in the king and diet jointly. The diet or *Rigsdag* consists of two chambers, the *Landsthing* or upper house, the *Folkething* or

lower house. The former is a senate of 66 members, 12 of whom are nominated for life by the crown, the others being elected for 8 years. The members of the Folkething are 102 in number, directly elected by universuffrage, and hold their seats for 3 sal The Rigsdad meets every October, and years. all money bills must be submitted to the jower The army consists of all the ablehouse. bodied young men of the kingdom who have arrived at the age of twenty-one years. The time of service is 8 years in the regular troops, and afterward 8 more in the reserve. Every corps has to drill for 30 to 45 days every year. The army on a war footing has a total strength of 1,352 officers and 45,910 men. The navy consists of 45 vessels and 135 guns. The revenue usually amounts to about \$15,000,000. The national debt is \$33,004,722. History.—The oldest inhabitants of Denmark

were the Cimbri, who dwelt in the peninsula of Jutland, the Chersonecus Cimbrica of the Romans. They first struck terror into the Romans by their incursion, with the Teutons, into the rich provinces of Gaul (113-101 B.C.). After this, led by the mysterious Odin, the Goths broke into Scandinavia, and appointed chiefs from their own nation over Denmark, Norway, and Sweden. For a considerable time Denmark was divided into a number of small states, whose inhabitants lived mostly by pir-acy along the neighboring coasts. In 787 they began to make their descents on the eastern coasts of England, and along with other inhabitants of Scandinavia they conquered Normandy in 876-77. Under Gorm the Old all the small Danish states were united in 920, and his grandson Sweyn, now the head of a powerful kingdom, commenced the conquest of Norway and of England, which was ultimately completed by his son Canute. Canute d. in 1035, leaving a powerful kingdom to his successor, who, in 1042 lost England, and in 1047 Norway. In 1047 Sweyn Magnus Estridsen ascended the throne, but with the exception of the great Waldemar the new dynasty furnished no worthy ruler, and the power of the kingdom decayed considerably till the accession of the politic Queen Margaret in 1387, who estab-lished the union of Calmar in 1397, uniting under her rule Denmark, Sweden, and Norway. Under the rule of Christian, Norway, Sweden, Schleswig, and Holstein were connected with the crown of Denmark, but under his successor Christian II Sweden established its independ-Under Frederick I (1523-33), the refence. ormation was introduced. Christian IV of Denmark ascended the throne in 1588, took part in the Thirty Years' War, and engaged twice in a war with Sweden, with most unfortunate results. Frederick III again engaging in war with Sweden in 1657 was equally unsuc-cessful. Christian V and Frederick IV were conquered in the war with Charles XII. Denmark, however, after the fall of Charles XII, gained by the peace of 1720 the toll on the Sound, and maintained possession of Schleswig. After this Denmark enjoyed a long repose. In 1800, having acceded to the northern confed-

eracy, the kingdom was involved in a war with Great Britain, in which the Danish fleet was defeated at Copenhagen, April 2, 1801. In 1807, there being reason to think that Denmark would join the alliance with France, a British fleet was sent up the Sound to demand a defensive alliance or the surrender of the Danish fleet as a pledge of neutrality. Both were de-nied, till the Danish capital was bombarded and forced to capitulate, the whole fleet being delivered up to the British. The war, however, was concluded by which she ceded Heligoland to England in exchange for the DanishWest India Islands, and Norway to Sweden in exchange for Swedish Pomerania and Rügen, which, however, she shortly after surrendered to Prussia, receiving in return Lauenburg and a pecuniary compensation. In June, 1815, the king entered into the German confederacy, as representing Holstein and Lauenburg. In 1848 Schleswig and Holstein revolted and were not finally subdued till 1852. In 1857 the Sound dues were abolished. Frederick VII d. in 1863 and with him the Oldenburg line became extinct. He was succeeded by Christian XI. At the commencement of 1864 the Danish territory was politically distributed into four parts; viz., Denmark Proper, the duchy of Schleswig, or South Jutland, the duchy of Holstein, the duchy of Lauenburg. The measures of the Danish government compelling the use of the Danish language in state schools having given great umbrage to the German population of the duchies, the disputes resulted in the intervention of the German confederation, and ultimately Holstein was occupied by the troops of Austria and Prussia (1864). After a short campaign the Prussians captured Alsen, overran the greater part of Julland, and forced the Danes to accept a peace (August 1). by which they renounced their right to the duchies of Schleswig, Holstein, and Lauenburg. A difference now arose between Austria and Prussia as to what should be done with the duchies, and Prussia showing an evident intention of annexing them, the result was a war between the two powers, which ended in the total defeat of Austria at Sadowa, or Königgrätz, July 3, 1866. By the treaty which followed Austria relinquished all claim to the duchies, which thus fell to Prussia.

Language and Literature.-The Danish language belongs to the Scandinavian branch of the Teutonic family of languages, and is a sister of the Swedish and Norwegian. It is the most modern of the Scandinavian tongues; soft and rather monotonous, with shades of sound difficult for a foreigner to acquire. It is written either in the German or the Roman character. From the long union of Norway with Denmark, Danish became the written language of the Norwegians, and is still the language of the educated classes. 'The oldest literary monuments of the Danish language consist of the laws of the early kings in the twelfth century. During the Reformation period Christian Pedersen (1480-1554) did for the Danish language much what Luther did for the German, by publishing, besides other works, a translation of the New Testament and the Psalter and latterly the complete Bible. Modern Danish poetry commences in the period succeeding the Reformation with hymns, Scriptural dramas, edifying narratives, etc. Justesen Raach and Erik Pontoppidan the elder are among the chief names in this department. Anders Bording (d. 1677) and Thomas Kingo (d. 1723) made names as lyric poets, the sacred poems of the latter being a noble contribution to Danish literature. A new epoch began with Louis Holberg (1684-1754), who was the founder of the Danish stage, and his name and that of the lyric and dramatic poet Ewald mark the brightest period of the national litcrature. Among the comic dramatists Peder Andres Heiberg, and among song writers the celebrated Jens Baggesen, hold the first place. Fresh life was inspired into Danish poetry by Adam Ochlenschläger (1779-1850), contempo-rary with whom was Adolf Wilhelm Schack Staffeldt (1770-1826), a lyric poet of the first rank. In 1811 Bernhard Severin Ingemann made his appearance, first as a lyric poet, but afterward turning his attention to the drama, and later to the historic romance.

Den'sity, in physics, the quantity of matter contained in a body under a given bulk. If a body of equal bulk with another contains double the quantity of matter it is of double the density. Or if a body contain the same quantity of matter as another, but under a less bulk, its density is greater in proportion as its bulk is less than that of the other. Hence the density is directly proportional to the quantity of matter, and inversely proportional to the bulk or magnitude. The relative quantities of matter in bodies are known by their gravity or weight, and when a body, mass, or quantity of matter is spoken of, its weight or gravity is always understood, that being the proper measure of the density or quantity of matter. The weights of different bodies, of equal bulks, indicate their relative densities. The density of solids, fluids, and gases, as compared with that of water, is their Specific Gravity.

**Denta'ria**, coral-root, a genus of plants, natural order Cruciferæ. There are about twenty species, natives of temperate countries. They are ornamental herbs, with creeping, singularly-toothed root-stocks, from which they receive the names of coral-root and tooth-wort. The stem leaves are opposite or in whorls of three, and the flowers are large and purple.

**Denta' tus**, MANIUS CURIUS, an ancient Roman general of Sabine descent. In B. c. 290 he brought to a victorious termination the war with the Samnites, which had lasted for nearly fifty years. In B. c. 275 he defeated King Pyrrhus at Beneventum, for which he received a magnificent triumph. In B. c. 274 he was made consul for the third time and conducted to a successful issue the last war with the southern Italians. He died about B. c. 270.

Den'tils, in architecture, the little cubes

resembling teeth, into which the square member in the bed-molding of an Ionic, Corinthian. or Composite cornice is divided.

Den'tine, the ivory tissue lying below the enamel and constituting the body of a tooth. It consists of an organic basis disposed in the form of extremely minute tubes and cells, and of earthy particles.

Den'tistry, the art of cleaning, extracting, repairing, and replacing teeth. There are two very distinct departments in dentistry, the one being dental surgery, the other what is known as mechanical dentistry. The first requires an extended medical knowledge on the part of the practitioner, as, for instance, a knowledge of diseases whose effects may reach the teeth. of the connection between the welfare of the teeth and the general system, etc., as well as ability to discern latent oral diseases, calculate the effects of operations, etc. The chief operations in this department are scaling, or removing the tartar which has accumulated on the base of the teeth; regulating, the restoring of overcrowded and displaced teeth to their proper position; stopping or stuffing, the filling up of the hollow of a decayed tooth and thus preventing the progress of decay; extracting, a process requiring considerable muscular power and delicacy of manipulation. The second department, mechanical dentistry, is concerned with the construction of artificial substitutes for lost teeth, and requires much mechanical science, it being a very delicate work to give artificial teeth a perfectly natural appearance in shape and color. The actual construction of the teeth, however, has passed largely into the hands of the manufacturers, and the dentist has only the selecting, fitting, and fixing to do. In the U.S. the Baltimore College of Dental Surgery is the oldest, being chartered in 1839: the Ohio College of Dental Surgery followed in 1845; the Philadelphia College of Surgery in 1850; the Philadelphia Dental College in 1863; the New York College of Dentistry in 1865, and various others. The American Journal and Library of Dental Science was established in Baltimore in 1839. Every state has now its state dental society; besides national organizations, of which the American Dental Association is among the most important.

**Denver**, a city, capital of the state of Colorado, named after General Denver, on the right bank of the South Platte River, 15 mi. e. of the Rocky Mountains. It is well built, having imposing public and other buildings, and is increasing with extraordinary rapidity, being the junction of eight important railway systems, and having various flourishing industries. The climate is peculiarly dry and salubrious. The town was founded in 1858. Pop. 106,713.

**Deodoriz ers,** chemical substances which have the power of destroying fetid effluvia. as chlorine, chloride of lime, etc.

D'Eon de Beaumont (dā-on dē bō-mōn). CHARLES GENEVIEVE LOUISE AUGUSTE ANDRE TIMOTHEE (1728-1810). a notorious French char acter, chevalier, doctor of law, diplomatist, etc. In 1755 he was sent as envoy on a difficult mis-

sion to the Russian court, on which occasion he seems to have dressed himself as a woman. He afterward distinguished himself in the Seven Years' War, then went to London as secretary of the French legation, and ultimately became minister plenipotentiary. Having quarreled with the French government, he lived fourteen years in London in a kind of banishment. During these years he had occasionally, probably for purposes of intrigue, dressed and passed as a female, and about this time his sex began to be doubted. In 1777 he returned to France, was ordered to dress as a woman, and continued to do so both there and after he returned to England (in 1785), where he died in great poverty, being then regarded by every one as a female.

**Depart' ment**, the name given to the principal territorial divisions of France. At the time of the French Revolution departments replaced the old division into provinces, the change being voted in the Constituent Assembly in 1789. There are at present eighty-seven departments, each of which is subdivided into arrondissements.

**De Pauw University**, at Greencastle, Putnam co., Ind., one of the chief institutions of learning maintained by the Methodist Church, constituted in 1837. It is excellently endowed, mainly by the liberality of the Hon. W. C. de Pauw, has a staff of 35 professors and teachers, and over 600 students.

**Depo'nent,** 1, in grammar, a verb passive in form, but active or neuter in signification. 2, In law, a person who makes an affidavit, or one who gives his testimony in a court of justice; a witness upon oath.

**Dept' ford** (det' ford), a parliamentary borough, England, in the counties of Kent and Surrey, on the right bank of the Thames, forming now part of London. It has some manufactures of pottery, chemicals, soap, etc. The old naval dockyard was shut up in 1869, but the royal victualling yard is still the largest establishment of its kind. Pop. 101,326.

**Depew**, CHAUNCEY MITCHELL, orator and lawyer, b. in Peekskill, N. Y., April 23, 1834. He graduated at Yale in 1856. In 1861–62 he was a member of the New York Assembly. In 1863 he was elected secretary of state. In 1866 he became attorney for the Harlem Railroad Company, and. in 1869, became counsel for the consolidated New York Central & Hudson River Railroad Company. In 1874 the legislature appointed him regent of the state university. In 1882 he became second vice-president of the New York Central & Hudson River Railroad Company, and in June, 1885, was elected to the presidency. He is also president of the West Shore Railroad Company. At the present time he is president of the Union League Club of New York City, and of the Yale Alumni Association of that city.

De Quincey, THOMAS (1785-1859), a wellknown English author, was the son of a Manchester merchant, and b. at Greenhays, near Manchester. In 1803 he matriculated at Oxford, and it was in the second year of his course there that he began to take opium in order to alleviate severe neuralgic pains. On leaving college he settled at Grasmere, Westmoreland, in the vicinity of Wordsworth and Southey, and devoted himself to literary work. Here or in London he remained till 1828, reading voraciously, and writing for the London Magazine, Knight's Quarterly Magazine, and latterly Bluckwood's Magazine. From 1828 to 1840 he lived in Edinburgh, then removed with his family to Lasswade, which continued to be his headquarters. He d. at Edinburgh.

**Dera Ghazi Khan**, a district and town in the Punjab, Hindustan. The former, which is in Derajat division, has an area of 4,517 sq. mi. and a pop. of 363,346. The town has a pop. of 22,309, half Hindus and half Mohammedans. It has extensive manufactures of silk, cotton, and coarse cutlery.

**Dera Ismail Khan**, a district and a town in Hindustan, in the Punjab, in the division of Derajat. The district lies n. of that of Dera Ghazi Khan on both sides of the Indus, and has an area of 9,296 sq. mi., and a pop. of 441, 649. The town is a staple place for cotton goods. Pop. 22,164.

**Derajat** (-jät'), a division or commissionership of Hindustan, in the Punjab, occupying part of the valley of the Indus, and comprising Dera Ghazi Khan, Dera Ismail Khan, and Bannu; area 17,681 sq. mi. It is well watered and fertile, and contains numerous towns and villages. Pop. 1,137,572, mostly Mohammedans.

Derby, a municipal borough in England. capital of Derbyshire, on the Derwent, 115 mi. n.n.w. London. It has some fine public buildings, among which are the churches of All Saints, St. Alkmund, and St. Werburgh, the county hall, school of art, infirmary, etc. There is also a very handsome free library and museum. The principal manufactures are: silk, cotton, paper, articles in Derbyshire spar, castings, and porcelain, etc. Derby is one of the oldest towns in the kingdom, and is supposed to owe its origin to a Roman station, Derventio, situated at Little Chester, on the opposite side of the river. Pop. 94,146. The county of Derby, or Derbyshire, in the center of the kingdom, area 1,029 sq. mi., five sixths being arable or in permanent pasture. It exhibits much varied and romantic scenery, the southern and eastern parts having a fertile soil, while the northwestern portion is bleak, with a rocky and irregular surface. Oats and turnips are important crops, and dairy-husbandry is carried on to a large extent. Coal is abundant in various parts of the county, iron ore is also plentiful, and lead, gypsum, zinc, fluor-spar, and other minerals are obtained. The manufactures are silk, cotton, and lace, machinery and agricultural im-

plements. Pop. 527,886. Derby, New Haven co., Conn., at the junction of Housatonic and Naugatuck rivers. Railroad, N. Y. N. H. & H. Industries: desk manufactories, cotton mills, etc. Pop. est. 1897, 8,000.

**Der'rick**, a lifting apparatus consisting of a single post or pole, supported by stays and

guys, to which a boom with a pulley or pulleys is attached, used in loading and unloading vessels, etc. Floating derricks of the strongest construction, with an immense boom and numerous blocks, are also used.

**Derrick-crane**, a kind of crane combining the advantages of the common derrick and those of the ordinary crane. The jib of this crane is fitted with a joint at the foot, and has a chain instead of a tension-bar attached to it at the top, so that the inclination, and consequently the sweep, of the crane can be altered at pleasure.

Der'vish (or Dervise; Persian, "poor"), a Mohammedan devotee, distinguished by austerity of life and the observance of strict forms. There are many different orders of them. Some live in monasteries, others lead an itinerant life, others devote themselves to menial or arduous occupations. They are respected by the common people, and the mendicants among them carry a wooden bowl into which the pious cast alms. One of their forms of devotion is dancing or whirling about, another is shouting or howling, uttering the name Allah, accompanied by violent motions of the body, till they work themselves into a frenzy and sometimes fall down foaming at the mouth. They are credited with miraculous powers, and are consulted for the interpretation of dreams and the cure of diseases.

**Desault** (désō), PIERRE JOSEPH (1744-1795), one of the most celebrated surgeons of France. He became principal surgeon in the hospital De la Charité, and in 1788 was put at the head of the great Hôtel Dieu in Paris. Here he founded a surgical school, in which many of the most eminent surgeons of Europe were educated.

Des' cant, in music, an addition of a part or parts to a subject or melody, a branch of musical composition which preceded the more modern counterpoint and harmony, coming into existence at the end of the eleventh or beginning of the twelfth century.

Descartes (da-kart), RENE (1596-1650), a great French philosopher and mathematican, with whom the modern or new philosophy is often considered as commencing. He was educated at the Jesuit College of La Flèche, where he showed great talent. He entered the military profession and served in Holland and in Bavaria. In 1621 he left the army, and after a variety of travels finally settled in Holland, and devoted himself to philosophical inquiries. Descartes, seeing the errors and inconsistencies in which other philosophers had involved themselves, determined to build up a system anew for himself. He also contributed greatly to the advancement of mathematics and physics. The higher departments of geometry were greatly extended by him. His system of the universe attracted great attention in his time, though long since exploded. It rested on the hypothesis of celestial vortices, immense currents of ethereal matter, by which he accounted for the motion of the planets. His works effected a great revolution in the principles and methods of philosophizing.

Descent', in law, is the transmission of the right and title to lands to the heir, on the decease of the proprietor, by the mere operation The rule determining to whom an . of law. estate belongs, on the decease of the proprietor. is that of consanguinity, or relationship by blood, though with some exceptions, as in the case of the portion, or the use of a portion. of a man's property given by the law to his widow. In the U.S. the laws are founded upon the principle of equal distribution both of real and personal estate among heirs of the nearest surviving degree. Kindred in blood are divided into three general classes, viz., l. descendants; 2, ancestors; 3, collateral relatives. that is, those who have descended from the same common ancestor. The civil law computes the degrees by counting the generations up to the common ancestor, as father, grandfather, great-grandfather; or mother, grand-mother, great-grandmother; and from him or her down to the collateral relative, as brother, cousin, etc., making the degree of relationship the sum of these two series of generations." Every person has two sets of ancestors, the paternal and maternal, and therefore two sets of collateral relatives. There is also a distinction of collateral kindred, into those of the whole blood and those of the half blood.

**Desiccation**, a process of dispelling moisture by the use of air, heat, or chemical agents such as chloride of calcium, quick-lime, oil of vitriol, and fused carbonate of potash. *Desiccation cracks*, in geology, are the fissures caused in clayey beds by the sun's heat, and seen in various rock strata.

De Smet, PETER JOHN (1801-1872), missionary, b. in Termonde, Belgium; d. in St. Louis. Mo. In 1821 he sailed from Amsterdam in company of Bishop Verinx. In 1828 he went to St. Louis and assisted in establishing the University of St. Louis, and in 1838 was sent to establish a mission among the Pottawatomies. On April 30, 1840, he attached himself to the yearly caravan of the American Fur Company to proceed as missionary among the Flat Head Indians of the Rocky Mountains. In 1841 he returned to St. Louis, but soon set out anew for Indian conversions. On different occasions he efficiently interceded to prevent strife between the U. S. and the Indians; he was also instrumental in ending the Sioux War.

Des Moines, Polk co., Iowa, on Des Moines and Raccoon rivers. It has 17 diverging lines of railroad. Industries: starch factory, flour mill, woolen mill, six iron foundries, and a large number of other factories. Polk county is underlaid by 500,000,000 tons of coal. Two libraries, 9 colleges, 65 churches, and 4 daily newspapers. The town became a city in 1846. Pop. est. 1897, 50,000.

Des Moines, the largest river in the state of Iowa, rises in the s w. of Minnesota and flows in a s.e. direction till it falls into the Mississippi about 4 mi. below Keokuk, after a course of 300 mi.

**Desmoulins** (då-mö-lan), BENOIT CAMILLS (1760-1794), was conspicuous during the first period of the French Revolution. He was

#### Desna

among the most notable of the pamphleteers and orators who urged the multitude forward in the path of revolution.

**Desna**, a river in Russia, which rises in the government of, and about 50 mi. e. of the town of Smolensk, flows through the governments of Orel and Tchernigov till it joins the Dnieper near Kiev. It is 500 mi. in length and navigable nearly throughout.

**De Soto**, FERNANDO (1496-1542), a Spanish explorer and discoverer of the Mississippi. He accompanied expeditions to the New World under Davila and Pizarro, and played a distinguished part in the conquest of Peru. In 1539 he led an expedition to Florida, whence after many difficulties he penetrated to the Mississippi, where he was attacked with fever and died. The name De Soto has been given to a county in the n.w. of Mississippi, and to several places in the U. S.

**Dessalines** (dā-sà-lēn), JEAN JACQUES (1760-1806), Emperor of Hayti, b. in Africa. His talents for war, his courage, and unscrupulous conduct raised him to command in the insurrections of the colored people, and after the deportation of Toussaint-L'Ouverture, and the subsequent evacuation of the island by the French, Dessalines was appointed governor general for life with absolute power; and the year following (1804) was declared emperor with the title of Jacques I. He was slain by one of his soldiers.

**Dessau** (des'ou), a town in Germany, capital of the duchy of Anhalt, in a beautiful valley on the left bank of the Mulde, mostly well built, with fine squares and many handsome buildings. The manufactures consist of woolens, woolen yarn, carpets, machinery, tobacco, etc. The ducal palace has a picture gallery and interesting relics and antiquities. Pop. 27,766.

**Deter' minism,** a philosophical theory which holds that the will is not free, but is invincibly determined either—according to the older form of the theory—by a motive furnished by Providence, or—according to the modern form — by the aggregation of inherited qualities and tendencies.

**Detroit**, Wayne co., Mich., on Detroit river. Railroads: Michigan Central; Wabash; L. S. & M. S. It is one of the most important of the lake ports. Its marine traffic amounted in 1805 to \$29,000,000. It has many manufacturing industries, there being about 1750 separate establishments employing nearly 40,000 persons. Among them are sawmills, flour mills, ship yards, foundries, tanneries, blast furnaces, tobacco and cigar manufactories, and locomotive car works. There are also extensive pharmaceutical establishments. Detroit has a magnificent system of parks and boulevards and is noted as one of the best drained cities in the U. S. It was settled by the French in 1701. Pop. est. 1897, 210,000.

the French in 1701. Pop. est. 1897, 210,000. Detroit River, or Strait of St. Clair, a river or strait of North America, which runs from Lake St. Clair to Lake Erie. It is 28 mi. long, and of sufficient depth for the navigation of large vessels. It is about  $\frac{4}{5}$  mi. wide opposite Detroit and enlarges as it descends.

Devens, CHARLES, soldier, b. in Charleston, Mass., April 4, 1820; graduated at Harvard in 1838; and became a lawyer. He served in the Civil War, and was brevetted major general after the capture of Richmond. In 1867 he became a superior court justice in Mass., and in 1873 justice of the state supreme court. In 1877 he became attorney general of the U. S., and in 1881 one of the supreme court justices of Mass.

Dev'enter, an old town in Holland, prov. of Overijssel, 8 mi. north from Zutphen, at the confluence of the Schipbeek and Ijssel. Its Industries embrace carpets, cast-iron goods, printed cottons, hosiery, and a kind of cake called Deventer cakes. It has a large export trade in butter. Pop. 22,700.

Deviation of the Compass, the deviation of a ship's compass from the true magnetic meridian, caused by the near presence of iron. In iron ships the amount of deviation depends upon the direction, with regard to the magnetic meridian, in which the ship lay when being built. It is least when the ship has been built with her head south. Armor-plated ships should be plated with their head in a different direction from that in which they lay when built. The mode now generally employed to correct deviation is by introducing on board ship masses of iron and magnets to exactly neutralize the action of the ship's magnetism. Compasses are sometimes carried on masts in iron vessels as a means of removing them from the disturbing influence of the iron of the hull. In this position they serve as standards of comparison for the binnacle compass. Wooden ships are also affected, though in a far less degree, by the direction in which they lie when building.

**Devil**, in theology, an evil spirit or being; specifically the evil one, represented in Scripture as the traducer, father of lies, etc. Most of the old religions of the East acknowledge a host of devils. The doctrine of Zoroaster, who adopted an evil principle called Ahriman, opposed to the good principle and served by several orders of inferior spirits, spread the belief in such spirits among the people. The belief in such spirits among the people. Greek mythology did not distinguish with the same precision between good and bad spirits. With the Mohammedans Eblis, or the devil, was an archangel whom God employed to destroy a pre-Adamite race of jinns, or genii, and who was so filled with pride at his victory that he refused to obey God. The Satan of the New Testament is also a rebel against God. He uses his intellect to entangle men in sin and to obtain power over them. But he is not an independent self-existent principle like the evil principle of Zoroaster, but a creature subject to omnipotent control. The doctrine of Scripture on this subject soon became blended with numerous fictions of human imagination, with the various superstitions of different countries, and the mythology of the pagans. The excited imaginations of hermits in their lonely retreats, sunk as they were in ignorance

and unable to account for natural appearances, frequently led them to suppose Satan visibly present; and innumerable stories were told of his appearance, and his attributes - the horns, the tail, cloven foot, etc. — distinctly described. In consequence of the cures which Christ and his apostles performed on the possessed, the early church believed in a power connected with the consecration of priests to drive out evil spirits. The belief in evil spirits, witches, etc., was in the seventeenth century so common that they became the objects of judicial With the progress of the natural process. sciences, however, in the eighteenth century many wonderful phenomena became explained, and less was heard of witchcraft.

**Devil**, the machine through which cotton or wool is first passed to prepare it for the carding-machines; a teasing-machine.

Devil-fish, the popular name of various fishes, one of them being the angler. Among others the name is given to several large species of ray occasionally captured on the Atlantic and Pacific coasts, and much dreaded by divers, whom they are said to devour after enveloping them in their vast wings. During gales of wind or from strong currents these immense fish are driven into shoal water, and being unable to extricate themselves, fall an easy prey to the vigilance of the fishermen, who obtain considerable quantities of oil from their livers.

**Devil Plant,** a most deadly plant found in the neighborhood of Philadelphia. It has a pleasant appearance, being of a tender green, clinging close to the earth, and sprinkled with small red blossoms, cup-shaped, and holding in their hearts a single drop of moisture, which the sun has no power to dispel, and wherein this plant's most blighting influence is said to lie. Bees by the hundred have been found dead in the blossoms, and a botanist who tasted this poison-drop declared that it was of a sickening sweetness, without odor, and like liquid Allowed to dwell on his tongue, it soon gum. began to burn and raise a blister, while the tongue became swollen and very painful. Cattle eating of it die in a few hours in great agony, with a sort of exaggerated tetanus.

**Devil's Bridge**, a famous bridge in Switzerland, over the Reuss, built of stone from mountain to mountain, 75 ft. in length, on the road over St. Gothard, from Germany to Italy.

**Devil-worship**, the worship paid to the devil, an evil spirit, a malignant deity, or the personified evil principle in nature, by many of the primitive tribes of Asia, Africa, and America, under the assumption that the good deity does not trouble himself about the world; or that the powers of good, and have in consequence to be bribed and reconciled. There is a sect called devil-worshipers inhabiting Turkish and Russian Armenia, and the valley of the Tigris, who pay respect to the devil, to Christ, and to Allah, or the supreme being, and also worship the sun.

**Devon** (Devonshire), a maritime county in the s. w. of England. Area 2,586 sq. mi., the county being the third largest of England. Tin, lead, iron, copper, manganese, granite, and the clay used by potters, and pipemakers are the chief mineral products. The geological formation of the old red sandstone is so largely developed that the term Devonian has to some extent become its synonym. Agriculture is in a somewhat backward state. The clotted cream and cider of Devonshire are well-known as specimens of the county. Pop. 631, 767.

Devo'nian System, in geology, a name originally given to rocks of Devonshire and Cornwall, intermediate between the Silurian and Carboniferous strata, and consisting of sandstones of different colors, calcareous slates and limestones, etc. They are divided into lower, middle, and upper groups, all containing fossils, but the middle most abounding in them, including corals, crinoids, crustaceans, mollusca (especially brachiopods), and cephlaopods. Devonian rocks occupy a large area in Central Europe, as well as in the U.S.. Eastern Canada, and Nova Scotia. The term has been often used as equivalent to old red sandstone.

Dev'onport, a port of England. It is the seat of one of the royal dockyards, and an important naval and military station. A bastioned wall and fosse defend the town on the northeast and south sides, while the sea entrance is protected by heavy batteries on Mount Wise. Connected with the dockyards and fortifications are the gun wharf, foundries machine works, rope walks, storehouses, naval and military barracks, etc. Pop. 54,736.

Dew is a deposition of water from the atmosphere upon the surface of the earth in the form of minute globules. During the day the earth both absorbs and emits heat, but after sunset its supply of warmth is cut off, while it still continues to radiate heat into the surrounding space. Grass, flowers, and foliage being good radiators, lose after sunset the heat which has previously been absorbed by them. without receiving any in return, and their temperature consequently falls considerably below that of the atmosphere. From the proximity of these cold substances the particles of vapor in the adjoining air are condensed and deposited upon their surfaces in the form of dew, or of hoar-frost where the temperature of the earth is below 32°. When the sky is clouded the heat abstracted from the earth's surface by radiation is restored by the clouds, which, being good radiators, send back an equal amount of heat to what they receive; and a balance of temperature being thus maintained between the earth and the sur-The rounding atmosphere, no dew is formed. deposition of dew is likewise prevented by wind, which carries away the particles of air before the vapor contained in them has been condensed. Horizontal surfaces, and those which are exposed to a wide expanse of sky receive a greater supply of dew than sheltered or oblique surfaces, where circumstances diminish the amount of radiation. The heavy dews which fall in tropical regions are in the highest degree beneficial to vegetation. which,

but for this supply of moisture, would, in countries where scarcely any rain falls for months, be soon scorched and withered. But after the high temperature of the day the ground radiates under these clear skies with great rapidity, the surface is quickly cooled, and the watery vapor, which, from the great daily evaporation, exists in large quantities in the atmosphere, is deposited abundantly. This deposition is more plentiful also on plants, from their greater radiating power; while on hard, bare ground and stones, where it is less wanted, it is comparatively triffing. In cold climates the earth, being cold and sufficiently moist, requires little dew; accordingly the clouds, which are so common in damp and chilly regions, prevent the radiation of heat: the surface is thus preserved warm, and the deposition of dew is, in a great measure, prevented.

**Dewás**, a native state of Central India consisting of two combined states with two chiefs. Total pop. 142,162. Dewás, the chief town, has a pop. of 11,921.

Dewberry, an edible fruit belonging to the order of the Rosaceæ, and to the same genus as the bramble, from which it is distinguished by its smaller berries, with fewer grains, and by the bloom, resembling dew, with which they are covered, and from which the plant derives its name. It abounds from Canada to Virginia, and its fruit is delicious.

De Witt, JAN (1625-1672), Grand-pensionary of Holland, celebrated as a statesman and for his tragical end; was the son of Jacob De Witt, burgomaster of Dort. In 1665 the war with England was renewed and conducted by De Witt with great ability till its termination in 1665. In 1672 Louis XIV invaded the Spanish Netherlands and involved Holland in war. De Witt's popularity, already on the decline, suffered still further in the troubles thus occasioned, and he felt it necessary to resign his office of grand-pensionary. At this time his brother Cornelius, who had been tried and put to torture for conspiring against the life of the young Prince of Orange, lay in prison. Jan De Witt went to visit him, when a tumult suddenly arose among the people, and both brothers were murdered.

**Dew-point**, the temperature at which condensation of the vapor in the air takes place. When the temperature of the air has been reduced by radiation to the dew-point, dew is deposited, and an amount of heat set free which raises the temperature of the air. Thus the dew-point will indicate what the minimum temperature of the night is likely to be, a knowledge of which is useful to the horticulturist.

**Dewsbury**, a town, England, in the West Riding of Yorkshire, and 30 mi. s.w. of the town of York, chiefly engaged in the manufacture of heavy woolen cloths, including blankets, carpets, rugs, flannels, baizes, etc.

**Dex'trine**, the soluble or gummy matter into which starch can be converted by the action of dilute acids or malt extract, or by heat. It is remarkable for the extent to which it turns the plane of polarization to the right hand, whence its name. Its composition is the same as that of starch. By the action of hot diluted acid, dextrine is finally converted into grapesugar. It is white, insipid, and without smell. It is a good substitute for gum-arabic in medicine.

**Dextro-compounds**, bodies which cause the plane of a ray of polarized light to rotate to the right. Dextrine itself, dextro-glucose, tartaric acid, malic acid, cinchoine, and many other bodies have this property; while others, which have the opposite effect, of causing the plane to rotate to the left, are called *larocompounds*.

**Dhárwár**, the chief town of Dharwar district, in the Bombay presidency. Hindustan, a straggling place with some trade. There is a fort well planned and strongly situated, but now falling into ruins, and military cantonments at 2 mi. distance. Pop. 27,191. The Dharwar district has an area of 4,535 sq. mi.; pop. 882,907.

**Dhawala'giri** (or Dhaulágiri), one of the highest peaks of the Himalayas, in Nepál; height, 26,826 ft.

Dholpur, native state of Central India, Rajputána; area 1,200 sq. mi.; pop. 249,657.

**Diag'onal Scale**, a scale which consists of a set of parallel lines drawn on a ruler, with lines crossing them at right angles and at equal distances. One of these equal divisions, namely, that at the extremity of the ruler, is subdivided into a number of equal parts, and lines are drawn through the points of division obliquely across the parallels. With the help of the compasses such a scale facilitates the laying down of lines of any required length to the 200th part of an inch.

**Diag'oras**, ancient Greek poet and philosopher, flourished about 425 B. C. He spent a great part of his life in Athens. He attacked the prevailing polytheism, and sought to substitute the active powers of nature for the divinities of the Greeks. On this account he had to leave Athens.

Dial (or sundial), an instrument for showing the hour of the day from the shadow thrown while the sun is shining by a stile or gnomon upon a graduated surface. This instrument has been known from the earliest times among Egyptians, Chaldeans, and Hebrews. From those eastern nations it came to the Greeks. It was introduced into Rome during the first Punic War. Dials are of various construction, horizontal, inclined, or upright, the principle in every case being to show the sun's distance from the meridian by means of the shadow cast by the stile or gnomon. The stile is made parallel with the earth's axis, and may be considered as coinciding with the axis of the diurnal rotation. Consequently, as the sun moves westward the shadow of the stile moves round in the opposite direction, falling on the meridian lines so marked as to represent the hours of the day. The dial, of course, gives solar time, which, except on four days of the year, is slightly different from that of a wellregulated clock. Dials are now rather articles of curiosity or ornament than of use.

Di'alect, the language of a part of a country, or a distant colony, deviating either in its grammar, vocabulary, or pronunciation, from the language of that part of the common country whose idiom has been adopted as the literary language and the medium of intercourse between well-educated people. Al-though the use of provincial dialects becomes inconvenient after a language has acquired a fixed literary standard, the study of such dialects is always valuable to the philologist for the light they throw on the history of the language. The diffusion of education and printed books has much relaxed the hold which the provincial dialects of various countries once had on the people, and in general it may be said that the educated classes of any country now speak each of them a uniform language.

**Dialec' tics,** the old name of logic, or the art of reasoning, but used in Kant's philosophy to mean the logic of appearance, or that logic which treats of inevitable tendencies toward error and illusion in the very nature of reason.

**Dial'ysis,** the separation of the *cripstalloid* constituent elements of a mixture from the *colloid*, the former being bodies which diffuse readily, such as sugar, salt, bichromate of potassium, etc.; the latter bodies which diffuse with difficulty or not at all, bodies resembling glue or gelatin, such as gum, starch, caramel, albumen, the ordinary constituents of food, etc., etc.

Diamagnet' ic, a term applied to substances which, when under the influence of magnetism and freely suspended, take a position at right angles to the magnetic meridian, that is, point east and west. From the experiments of Faraday it appears that all matter is subject to the magnetic force as universally as it is to the gravitating force, arranging itself into two great divisions, the paramagnetic and Among the former are iron, diamagnetic. nickel, cobalt, platinum, palladium, titanium, and a few other substances; and among the latter are bismuth, antimony, cadmium, copper, gold, lead, mercury, silver, tin, zinc, and most solid, liquid, and gaseous substances. When a paramagnetic substance is suspended freely between the poles of a powerful horseshoe magnet it points in a line from one pole to the other, which Faraday terms the axial On the otner hand, when a diamagnetic line. substance is suspended in the same manner it is repelled alike by both poles, and assumes an equatorial direction, or a direction at right angles to the axial line.

**Diam'eter**, the straight line drawn through the center of a circle, and touching the two opposite points of the circumference. It thus divides the circle into two equal parts, and is the greatest chord.

Di'amond, the hardest and one of the most valuable of gems, and the purest form in which the element carbon is found. It crystallizes in forms belonging to the regular or cubic system, the most common being the regular octahedron and rhombic dodecahedron

The finest diamonds are color-(twelve faces). less, perfectly clear, and pellucid. Such are said to be of the finest water. But diamonds are often blue, pink, green, or yellow, and such are highly prized if of a decided and equal tint throughout. The hardness of the diamond is such that nothing will scratch it, nor can it be cut but by itself. The value of a diamond is much enhanced by cutting facets upon it in-clined at certain angles to each other so as to produce the greatest possible play of color and luster. What is called the brilliant cut best brings out the beauty of the stone. Its upper or principal face is octagonal, surrounded by many facets. But this form of cutting re-ouries an originally well-shaped stone. For quires an originally well-shaped stone. other diamonds the rose cut is used. In this form six triangles are cut on top so that their apices meet in a point called the summit. Round this are disposed other facets. Stones which are too thin to cut as rose-diamond are cut as table-diamonds, which have a very slight play of color. The art of cutting and polishing the diamond was unknown in Europe till the fifteenth century, and the stone itself was not nearly so highly valued in the Middle Ages as the ruby.

The uncut diamond looks like a piece of quartz. It is of a dull white color and full of rough seams. In this condition it is set into a matrix of wax which is fastened to the end of a stick. The wax becomes very hard after it is once heated. In another matrix a cheap diamond is set and a workman grinds the two stones together, until the one to be cut has as-The sumed the general form of a brilliant. dust and chips which come off are care-fully collected and used afterward in polish-The rough stone is then firmly ing work. fixed in a matrix of metal composed of zinc and lead and set into a cup-shaped instrument of iron. The workman is then ready to begin cutting. In this process an iron disk turning at the rate of 2,000 revolutions a minute is used. Upon the disk is sprinkled a supply of diamond dust which sinks into the minute pores of the iron and produces the sharpest grindstone that can be made. The workman. with a magnifying glass close to his eye, grinds first the table or top part of the brilliant. This completed, the metal matrix is melted from the stone which is put in, face downward, so that the exact opposite of the stone will be ground. After this, one by one, the facets or bezils are cut, the first two opposite and parallel, and the second two at right angles to the first two. If the diamond is large the corners remaining between the four opposite cuts are also beveled. Then the stone is turned over in its matrix. and the facets between the girdle and the point known as the collet are cut in the same way. Rubies and sapphires are cut by the same general process. Moss-agate, topaz. agate, amethysts and other half-precious stones are first sawed into proper sizes with a soft tin When the agate, for instance, has wheel. been sawed to the proper shape, it is smoothed down on an ordinary grindstone, and then taken in hand by the polisher, who applies it to

#### Diamonds

a fine grindstone, and, after being ground for about an hour, it is ready for the market.

Diamonds are valuable for many purposes. Their powder is the best for the lapidary, and they are used for jeweling watches, as lenses for miscroscopes, and in the cutting of window and plate glass. When used as a glazier's tool the diamond must be uncut. Inferior kinds of diamonds are also extensively used by engineers in rock boring, and by copperplate engravers as etching points. Diamonds are obtained from alluvial deposits (sands, clays, etc.), being separated by washing. They are found in India, Borneo, and other parts of the East; sometimes in North America and Australia; but the chief diamond fields of to-day are Brazil and Cape Colony, the center of the latter being Kimberley in Gruqualand West.

#### Diastase

at \$2,250,000. Recently, by an expensive process, minute crystals of diamond have been artificially produced.

Dian'a, in mythology, an ancient Italian goddess whom the Romans latterly identified with the Greek Artemis, with whom she had various attributes in common, being the virgin goddess of the moon and of the chase, and having as attributes the crescent moon, bow, arrows, and quiver. She seems to have been originally the patron divinity of the Sabines and Latins. She was worshiped especially by women as presiding over births, no man being allowed to enter her temple.

Diana Monkey, a species of monkey found in Africa, and so named from the crescentshaped band on the forehead resembling the crescent moon, which was the symbol of Diana. Dian'dria, the



Diamonds. a.- Great Mogul; b.- Star of the South; c.- Koh-i-nur; d.- Regent; e.- Orloff. All actual size.

Diamonds were discovered in the latter only in 1867. One of the largest diamonds known (weight 367 carats) was found in Borneo about a century ago, and belongs to the Rajah of of Mattan. One of the most celebrated is the Koh-i-noor (Mountain of Light), belonging to the British crown. It weighed originally nearly 800 carats, but by subsequent recuttings has been reduced to 1033 carats. The Orloff diamond, belonging to the Emperor of Russia, weighs 195 carats; the Pitt diamond, among the French crown jewels, 1364. The former, which came from India, has been thought to have originally formed part of the Koh-i-noor stone. Bome of the South African diamonds are also very large, one of them (of inferior color) weighing 428 carats. The largest sum actually paid for a precious stone was \$625,000, given by the Duke of Orleans for the "Pitt" or "Regent" diamond, the stone being now valued Diam'oria, the second class in the Linnæan system, comprehending all genera with flowers having only two stamens, provided the stamens are neither united at their base, nor combined with the style and stigma, nor separated from the pistil.

**Diaphragm**(di'afram), in anatomy, a muscular membrane placed transversely in the trunk, and dividing the chest from the abd om inal cavity. In its natural situation the diaphragm is convex on the upper side and concave on its lower, but when the lungs are filled with air it becomes al most

flat. It is the principal agent in respiration, particularly in inspiration. A complete diaphragm is found only in Mammalia.

**Diarbek'ir**, a town, Asiatic Turkey, capital of the pashalic of same name, on a high bank overlooking the Tigris, and surrounded by a lofty massive wall. It has manufactures of iron and copper ware, leather, silk, woolen, and cotton goods, and a considerable trade. Pop. about 40,000.

**D**i'astase, a substance existing in barley, oats, and potatoes, but only after germination. When in solution it possesses the property of causing fecula or starch to break up at the temperature of  $150^{\circ}$  F., transforming it first into dextrine and then into sugar. It is obtained by digesting in a mixture of three parts of water and one of alcohol, at a temperature of  $113^{\circ}$  F., a certain quantity of germinated barley ground and dried in the open air, and

43

then putting the whole under pressure and filtering it. Diastase is solid, white, and soluble in water and diluted alcohol, but insoluble in strong alcohol.

**Diaz**, BARTOLOMEU, a celebrated Portuguese navigator of the fifteenth century, named in 1846 commander of that long succession of exploratory expeditions which the Portuguese court had during this century become distinguished for promoting.

Diaz, PORFINIO, Mexican general, b. at Oaxaca. Sopt. 15, 1830. In 1867 he marched to Pueblo at the head of a Republican army, and took the city by storm, and afterward aided in the capture of the city of Mexico. He was proclaimed president of Mexico by Congress, serving from 1877 till 1880. During his term the tariff was revised, finances were improved, and important lines of railway established. He was succeeded by Gen. Manuel Gonzalez, and became minister of public works. In 1881 he was made governor of the province of Oaxaca. He was again elected president in 1884, 18-8, 1892, and 1896.

Dice, cubical pieces of bone or ivory, marked with dots on each of their six faces, from one to six, according to the number of faces. They are shaken in a small box and then thrown on the table. Dice are often loaded or falsified in some way so as to make the high or the low sides turn down. Dice are very ancient, being well known among the Egyptians and Greeks.

**Dichroite** (di'kro-It), a mineral, a silicate of magnesium, iron, and aluminium, which readily undergoes modifications and passes into other minerals. It exhibits different colors.

Dickens, CHARLES (1812-1870), one of the greatest English novelists, was b. at Landport, Portsmouth. He received a somewhat scanty education, was for a time a mere drudge in a blacking warehouse, and subsequently a clerk in an attorney's office. Having perfected himself in shorthand, however, he became a newspaper critic and reporter, was engaged on the Mirror of Parliament and the True Sun, and in 1835 on the Morning Chronick. In 1835 appeared in the Morning Chronicle the first of that series of Sketches by Boz which brought Dickens into fame. A new class of characters, eccen-tric indeed, but vital representations of the humors and oddities of life, such as Mr. Pickwick, Sam Weller and his father, Mr. Winkle, and others, were made familiar to the public. Under the name of the Posthumous Papers of the Pickwick Club this work was published in two volumes 8vo in 1837. In the same year Dickens was engaged as editor of Bentley's Magazine, to which he contributed Oliver Twist, a work which opened up that vein of philanthropic pathos and indignant satire of institutions which became a distinguishing feature of his works. As the special object of Oliver Twist was to expose the conduct of workhouses, that of Nicholas Nickleby was to denounce the management of cheap boarding schools. Master Humphrey's Clock, issued in weekly numbers, contained among other matter two other leading tales, The Old Curiosity Shop, and Barnaby

Rudge, the latter a historical tale. In 1841 Dickens visited America, and on his return he wrote American Notes for General Circulation. His next novel, Martin Chuzzlewit, dwelt again on his American experiences. The series of Christmas Tales, in which a new element of his genius, the power of handling the weird machinery of ghostly legend in subordination to his own peculiar humor, excited a new sensa-tion of wonder and delight. These enumerated consecutively were: A Christmas Carol, The Chimes, The Cricket on the Hearth. The Battle of Life, The Haunted Man, and the Ghost's Bargain. The extraordinary popularity of these tales created for a time a new department in literature, that of the sensational tale for the Christmas season. In 1845 Dickens went to Italy. and on his return the Daily News was intrusted to his editorial management; but this was an occupation uncongenial to his mind, and in a few months the experiment was abandoned. His Pictures from Italy were published the same year. Next followed his novel of Dombey and Son, and David Copperfield, a work which has a strong autobiographical element in it. In 1850 Dickens became editor of the weekly serial Household Words. In 1853 his Bleak Unue came out. A Child's History of England, commenced in Household Words, was published in 1852-54. Hard Times was published in 1854. Little Dorrit, commenced in 1856, dealt with imprisonment for debt, the contrasts of character developed by wealth and poverty, and executive imbecility, idealized in the Circum-In 1859 All the Year Round locution Office. superseded Household Words; and in the first number of this periodical was begun A Tak of Two Cities. Great Expectations followed in the same paper in 1860. In All the Year R and also appeared a series of disconnected sketches. called the Uncommercial Traveller. Our Mutual Friend, completed in 1865, and published in the usual monthly numbers, with illustrations by Marcus Stone, was the last great serial work which Dickens lived to finish. The first num-ber of his last work, The Mystery of Educin Drood, was issued in 1870, and only three numbers had appeared when he d. somewhat suddenly, at his residence. Gad's Hill Place. near Rochester, on June 9. He was buried in Dickens's work as a Westminster Abbey. novelist is firmly based upon wide and keen observation of men.

Dickinson, ANNA ELIZABETH, orator. was b. in Philadelphia, Pa., 1842. In 1857 she made her first venture as a speaker before the members of a society of "Progressive Friends." who were interested in the antislavery movement. In 1859-60 she taught school in Berks co., Pa., and in 1861, for about nine months, was employed at the U. S. mint, in Philadelphia. After that time she lectured in public. This she did with so much acceptation that, in 1862, she was invited to deliver an oration at Music Hall, in Boston, Mass., under the auspices of the New England leaders of the anti-slavery cause. From there she went to New Hampshire and Connecticut, and later drew large attendances in Cooper Union. New

York City, and at the Academy of Music, Philadelphia. After the close of the war she appeared mostly as a lecturer on the platform of literary societies. In 1876 she entered the dramatic profession, but this venture was unsuccessful.

Dickinson, DANIEL STEVENS (1800-1866), b. in Goshen, Conn., statesman. He became clerk in a clothing store, and afterward surveyed, taught school, and studied law. He became qualified as a lawyer in 1828, and as such settled in Guilford. In 1831 he removed to Binghamton. He became prominent as a Democratic politician, and in 1836 was chosen state senator. In 1842 he was chosen lieuten-ant governor of New York. 1844 he was ap-pointed to fill a vacany in the U.S. Senate, and later the legislature elected him for the full In 1852 he was nominated collector of term. the port of New York, which office he declined. From 1861 to 1863 he was active on the stump in making addresses on the national side; in 1861, also, he was elected attorney general for

the southern district of New York. Dickinson, Јонм (1732-1808), statesman, studied law in Philadelphia and at the Temple, London, and practised his profession in Philadelphia. In 1763 he was elected to the assembly. In 1798 he published his Letters to the Inhabitants of the British Colonies, by a Pennsylvania Farmer, showing that Parliament had no right to tax the colonies, and to him is due the phrase "no taxation without representation." These were republished in London by Benjamin Franklin, as the best presentation of the case, and they were also translated into French and commended by Voltaire. He was a member of the committee to draft the Declaration of Independence. He entered the army as a private. In 1779 he was elected to Congress from Delaware. In 1780 he was made a member of the assembly of Delaware, and was afterward president of that body. In 1872 he was made president of the supreme executive coun-cil\_of Pennsylvania.

Dicta tor, an extraordinary magistrate of the Roman Republic, first instituted B. c. 501. The power of naming a dictator when an emergency arose requiring a concentration of the powers of the state in a single superior officer, was vested by a resolution of the sen-ate in one of the consuls. The dictatorship was limited to six months, and the person who held it could not go out of Italy. The dictator was also forbidden to appear in Rome on horseback without the permission of the people, and he had no control over the public funds without the permission of the senate. He had the power of life and death, and could punish without appeal to the senate or people. All the other magistrates were under his orders

**Dictionary,** a book containing the words. or subjects, which it treats, arranged in alphabetical order. It may be either a vocabulary, or collection of the words in a language, with their definitions; or a special work on one or more branches of science or art prepared on the principle of alphabetical arrangement,

such as dictionaries of biography, law, music, medicine, etc. Among dictionaries of the English language, the earliest seem to have been those of Barett, 1573, and of Bullokar. That of Dr. Johnson published in 1755 1616. made an epoch in this department of literature. Previous to this the chief English dictionary was that of Bailey. a useful work in An enlarged edition of Johnson's its way. dictionary, by the Rev. H. J. Todd, appeared in 1818; and this, again enlarged and modified, was issued under the editorship of Dr. R. G. Latham (1864-72). The chief American dictionary of the English language is that by Noah Webster first published in 1828. It has been frequently republished, and in subsequent editions has almost entirely altered its character. Dr. Richardson's dictionary, first published in two volumes in 1836-37 (at London), is valuable chiefly for its copious illustrative quotations. The large American dictionary by Dr. Worcester has made a good position for itself. Dr. Ogilvie's English dictionary (based on Webster, and first published in 1847-50), has recently been published in a remodeled and enlarged form (4 vols. 1881-82, Chas. Annandale, LL.D., editor). Cassell's Encyclopædic Dictionary, is another extensive and useful work (1879-88). The Standard Dictionary and the Century Dictionary are the latest finished works in English lexicography on a large scale. The chief etymological dictionary of English words is that by Prof. Skeat (1882); the chief French is that of Littré; German, that of Grimm.

**Didactic Poetry**, that kind of poetry which professes to give a kind of systematized instruction on a definite subject or range of subjects. Thus the *Georgics of Vergil* and the *De Rerum Natura* of Lucretius profess to give, the one a complete account of agriculture and kindred arts, the other a philosophical explanation of the world. In a larger sense of the word most great poems might be called didactic, since they contain a didactic element in the shape of history or moral teaching. Dante's *Divina Commedia*, Milton's *Paradise Lost*, or Goethe's *Faust*, for example. The difference may be said to be this, that in the one case the materials are limited and controlled by nothing but the creative fancy of the poet, while in the other they are much more determined by the actual nature of the subject treated of.

**Diderot** ( $d\bar{e}d$ -r $\bar{o}$ ), DENIS (1713-1784), a French writer and philosopher, was b. at Langres, in Champagne, and educated in the school of the Jesuits, and afterward at Paris, at the College of Harcourt. His first works were the *Essau* sur le Mérite et la Vertu (1745); and the Pensées Philosophiques (1746), a pamphlet against the Christian religion. His Lettre sur les Areugles à l'Usage de Ceux qui Voyent, is in the same strain. These heterodox publications cost him an imprisonment for some time at Vincennes. Diderot now tried writing for the stage, but his pieces were failures. In 1749 he had begun along with D'Alembert and some others the Encyclopedia. At first it was intended to be mainly a translation of one already published in English by Chambers. Diderot and D'Alembert, however, enlarged upon this project, and made the new *Encyclopædia* a magnificently comprehensive and bold account of all the thought and science of the time. Besides his articles in the *Encyclopædia* he wrote numerous works, some of which were published after his death.

**Dido** (or Elissa), the reputed founder of Carthage. She was the daughter of the king of Tyre, and after her father's death her brother Pygmalion murdered her husband, Sicharbas, or as Vergil calls him Sichæus, with the view of obtaining his wealth. But Dido, accompanied by many Tyrians of her party, fled with all the treasure over sea, and landing on the const of Africa founded Carthage about 860 B. c.

**Didym'ium**, a rare metallic element occurring along with *lanthanium* in the mineral cerite as discovered by Mosander in 1843. Recently it is said to have been resolved into two new elements: *Praseodymium* and *Neodymium*.

**Dielectric**, a name applied by Faraday to any medium through or across which electrostatic induction can take place. Faraday first showed that electrostatic induction was not action at a distance, but took place by means of the insulating medium separating the two conducttors. The medium he named a *dielectric*, and measured its specific inductive capacity by taking that of common air as unity, \_

**Dieppe** (dē-ep'), a seaport town, France, department Seine-Inférieure, on the English Channel, at the embouchure of the Arques, 93 mi. n.n.w. Paris. Dieppe is one of the chief watering places of France, and is much frequented by visitors in summer and autumn. The manufactures include works in ivory, the most famed in Europe; works in horn and bone, lace-making, sugar-refining, shipbuilding, etc. There is a busy fishery, and the foreign trade is still considerable. In early times Dieppe was the chief port of France, but its prosperity diminished after the revocation of the Edict of Nantes (1685). Pop. 20,804.

Diesinking is the art of preparing dies for stamping coins, buttons, medallions, jewelry, fittings, etc. The steel for the manufacture of dies is carefully selected, forged at a high heat into the rough die, softened by careful annealing, and then handed over to the engraver. After the engraver has worked out the design in intaglio the die is put through the operation of hardening, after which, being cleaned and polished, it is called a matrix. This is not, however, generally employed in multiplying impressions, but is used for making a punch or steel impression for relief. For this purpose another block of steel of the same quality is selected, and being carefully annealed or softened, is compressed by proper machinery upon the matrix till it receives the impression. When this process is complete the impression is retouched by the engraver, and hardened and collared like the matrix. Any number of dies may now be made from this punch by impressing upon it plugs of soft steel. In place of this process

patterns are now frequently engraved upon rollers for transference to sheet metal by rolling pressure.

**Di**'et, a meeting of some body of men held for deliberation or other purposes; a term especially applied to the legislative or administrative assemblies of the German Empire. Austria, etc.

Dietet'ics, that part of medicine which relates to the regulation of diet. The ideal diet is clearly that which, without burdening the viscera uselessly, furnishes all necessary nutritive elements, with due consideration for special physiological conditions in any given case. No single substance contains the elements needed to replace its waste in their requisite proportions and a mixed diet is therefore necessary. The nature of the food most suitable for a healthy man is dependent in part upon general conditions, such as climate and season, and in part upon special conditions of individual habit.

of individual habit. **Differential Thermometer**, an instrument for determining very minute differences of temperature. Leslie's differential thermometer consists of two glass bulbs containing air connected by a bent tube containing some sulphuric acid, the movement of which serves to indicate any slight difference of temperature between the two bulbs.

**Digest'er**, a strong vessel of copper or iron. on which is screwed an air-tight cover with a safety valve, the object being to prevent loss of heat by evaporation. Water may be thus heated to  $400^{\circ}$  F., at which temperature its solvent power is so greatly increased that bones are converted into a jelly.

**Digit**, in arithmetic, any one of the ten numerals, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0. Digit is also a measure of a finger's breadth, equal to  $\frac{1}{2}$  in *Digit*, in astronomy, is the measure by which we estimate the quantity of an eclipse. The diameter of the sun or moon's disk is conceived to be divided into twelve equal parts, called *digits*; and according to the number of those parts or digits which are obscured, so many digits are said to be eclipsed.

**Digitigra' da**, a section of the Carnivora. <sup>50</sup> called from their walking on the ends of their toes; as distinguished from the Plantigrada. which, like the bear, place the whole foot upon the ground. This tribe includes the weasel. dog, cat, etc.

**Dijon** (dē-zhōn), a town in eastern France, capital of the department Cote-d'Or. It has important educational institutions and a valuable library. Industries: woolens, hosierycandles, mustard, vinegar. chemicals. paperhangings, etc., tanneries, foundries, machine factories, cotton and oil mills. The trade is considerable, particularly in the wines of Burgundy. Pop. 60,855.

**Dilem' ma**, in logic. an argument in which the same conclusion may be drawn from two contrary propositions. We append one of the most famous of the classical dilemmas. A young rhetorician said to an old Sophist: "lastruct me in pleading and I shall pay you when I gain a cause." The master sued for the re-

ward, and the scholar eluded the claim by a dilemma. "If I gain my cause I shall not pay you, because the award of the judge will be against you. If I lose it I may withhold it, as I shall not have gained a cause." The master replied: "If you gain you must pay me, because you promised to pay me when you gained a cause; if you lose you must pay me, because the judge will award it." The two results which are found equally objectionable are called the "horns" of a dilemma.

Dill, an umbelliferous plant, a native of the southern countries of Europe, the fruits (commonly but erroneously called seeds) of which are moderately warming, pungent, and aromatic, and are employed medicinally as a carminative. In appearance it resembles the fennel. Dill seeds yield dill water and an essential oil, when distilled with water. Dill water is used as a remedy in flatulency and gripes of children.

**Dillon**, JOHN, Irish statesman, b. in Ireland in 1851; entered Parliament in 1880 as a home ruler, was twice imprisoned as a "suspect," and was considered as Parnell's chief lieutenant in the House of Commons.

**Dim'ity, a** stout cotton fabric, ornamented in the loom either by raised stripes or fancy figures. It is usually employed white, as for bed and bedroom furniture.

**Dina** pur, a town, Hindustan, Patna district, Bengal, on the right bank of the Ganges, about 12 mi. n. w. of Patna, cantonment and military headquarters of the district, with extensive barracks. The environs are studded with handsome bungalows. Pop., with cantonment, 37,893.

**Dingo**, the native wild dog of Australia, of a wolf-like appearance and extremely fierce. The ears are short and erect, the tail rather



Dingo.

bushy, and the hair of a reddish-dun color. It is very destructive to the flocks, killing more than it eats.

**Dino'ceras**, a fossil mammal found in the Eocene strata of North America. in some respects akin to the elephant and of equal size, but without a proboscis.

**Dinor' nis,** an extinct genus of large wingless birds — classed among the ostrich tribe the bones of five species of which have been found in New Zealand. The largest must have stood at least 14 ft. in height, several of its

## Diomedes

bones being at least twice the size of those of the ostrich.

**Dinosau'ria**, a group of colossal lizards, resembling the pachydermatous mammals in general appearance, but in reality intermediate between the struthious birds and lizards. The majority, as the Megalosaurus, which attained to 40 ft. in length, were carnivorous: the Iguanodon, however, was herbivorous. They were the land reptiles of the Jurassic, Wealden, and inferior Cretaceous continents.

**Dinothe' rium, a** genus of extinct gigantic mammals, the remains of which occur in Tertiary formations in several parts of Europe.



#### Dinotherium.

**Dinwiddie**, ROBERT (1690-1770), colonial governor of Virginia, was b. in Scotland and was governor of Virginia from 1752 to 1758, when he was recalled, after precipitating the French and Indian War, and by his ill temper, avarice, and incompetence, rendering himself generally unbearable to the Americans.

**Diocle tian** (C. Valerius Diocletianus, surnamed Jorius), a man of mean birth, a native of Dalmatia, proclaimed Emperor of Rome by the army 284 A.D. He defeated Carinus in Mœsia (286), conquered the Allemanni, and was generally beloved for the goodness of his disposition, but was compelled by the dangers threatening Rome to share the government with M. Aurelius Valerius Maximian.

Diogenes OF SINOPE (B.C. 412-323), the most famous of the Cynic philosophers. Having been banished from his native place with his father, who had been accused of coining false money, he went to Athens, and thrust himself upon Antisthenes as a disciple. Like Antisthenes he despised all philosophical speculations, and opposed the corrupt morals of his time; but while the stern austerity of Antisthenes was repulsive, Diogenes exposed the follies of his contemporaries with wit and good humor. As an exemplar of Cynic virtue he satisfied his appetite with the coarsest food. practised the most rigid temperance, walked through the streets of Athens barefoot, without any coat, with a long beard, a stick in his hand, and a wallet on his shoulders, and by night, according to the popular story, slept in a tub (or large earthenware vessel).

**Diomede Islands**, a group of three small islands in Bering's Strait, and midway between Asia and America.

**Diomedes** (dī-o-mē'dēz), in Greek mythology, 1, A king of the Bistones, who fed his horses on human flesh, and used to throw all strangers who entered his territories to those animals to be devoured. He was killed by Hercules, who carried off the horses. 2, One of the heroes at the siege of Troy, the son of Tydeus and Deipyle, and king of Argos, one of the suitors of Helen.

**Dionysius**, the Elder (B.C. 430-367), in Greek history, tyrant or absolute ruler of Syracuse, b. of obscure parentage. He obtained the rank of general, and afterward of commander-inchief; and gaining the support of the army, he seized the supreme power in Syracuse, though only twenty-five years of age. He extended his rule over other cities in Sicily; and after some successes and reverses in the struggle with the Carthaginians he gained a complete victory over them under the walls of Syracuse.

victory over them under the walls of Syracuse. **Dionysius**, the Younger, a tyrant of Syracuse, who in 367 n.c. succeeded his father, Dionysius the Elder.

**Diora' ma,** a mode of painting and of scenic exhibition invented by Daguerre and Bouton, and first exhibited in 1823. It secures a higher degree of illusion than the ordinary panorama, by a mode of uniting transparent painting to the usual opaque method, and causing the light to fall upon the picture both from *before* and behind. At the same time, by means of colored transparent blinds, suspended both above and behind the picture, the rays of light can be intercepted and made to fall at pleasure in graduated tints upon every part of the picture in succession.

**Dip**, in geology, the inclination or angle at which strata slope or dip downward into the earth. The degree of inclination or amount of the dip, which is easily measured by a special instrument, is determined by the angle which a line drawn perpendicular to the direction of the stratum makes with the horizon. The line in which such strata cut the surface is called the *strike*, and is always at right angles to the dip.

**Diphthong,** a coalition or union of two vowels pronounced in one syllable. In uttering a proper diphthong both vowels are pronounced; the sound is not simple, but the two sounds are so blended as to be considered as forming one syllable, as in *void*, *bough*. The term improper diphthong is applied to the union in one syllable of two or more vowels, of which only one is sounded, as in *bean*.

Di phyòdont, a term applied to those animals which develop two sets of teeth, a deciduous or milk set, and a permanent set—as distinct from the monophyodonts, which develop only one set. The majority of mammals are diphydont, though the number of teeth replaced may vary: thus in man twenty teeth of the adult are preceded by a milk set; in the hare, the anterior incisors are not so preceded, but the posterior smaller incisors replace an earlier pair.

**Diplet doscope**, an instrument for indicating the passage of the sun or a star over the meridian, by the coincidence of two images of the object, the one formed by single and the other by double reflection. It consists of an equilateral hollow prism, two of whose sides are silvered on the inside so as to be mirrors, while the third is formed of glass. The prism is adjusted so that one of the silvered sides shall be exactly in the plane of the meridian, and the transparent side toward the object.

Diplo' macy, the science or art of conducting negotiations, arranging treaties, etc., be-tween nations; the branch of knowledge which deals with the relations of independent states to one another; the agency or management of envoys accredited to a foreign court; the forms of international negotiations. The Cardinal de Richelieu is generally considered as the founder of that regular and uninterrupted intercourse between governments which exists at present between almost all the Christian powers; though the instructions given by Machiavelli to one of his friends, who was sent by the Florentine Republic to Charles V (Charles I of Spain) show that Richelieu was not the first to conceive the advantages that might be derived from the correspondence of an intelligent agent accredited at the seat of a foreign government. Diplomatic agents are of several degrees: 1, ambassadors; 2, envoys extraordinary and ministers plenipotentiary; 3. ministers resident; 4. charges d'affuires; 5. secretaries of legation and atlachés.

**Diplomat'ics**, originally the science of deciphering ancient MSS. It laid down certain principles for the systematic examination of public documents, and taught the forms and styles adopted in them, the titles and rank of public officers subscribing them.

Dip' noi, an order of fishes, including only the singular mudfishes, important as exhibiting the transition between fishes and the amphibia. Formerly Lepidosiren was reckoned the lowest of the amphibia; now it constitutes the highest order of fishes. The body is fish-like in shape. covered with small horny scales of a cycloid character; the pectoral and ventral fins are represented by two pairs of long filiform organs; the heart has two auricles and one ventricle, and the respiratory organs are twofold. consisting of ordinary gills opening externally. and of true lungs—formed by the modified swimming-bladder—communicating with the œsophagus by means of an air-duct or trachea, whence the name.

**Dippel's Oil**, the rectified form of the black fetid oil, containing ammonic carbonate, which can be obtained by the destructive distillation of animal matter, such as stag's horn, ivory, or blood. The cruder form was used in medicine, despite its appearance and odor, until Dippel refined it. His oil was formerly prescribed as an anti-spasmodic and diaphoretic, and as a hypnotic.

**Dipper**, a bird of the genus *Cinclus*, allied to the thrushes. The common dipper, water ousel, or water crow, is about 7 in. in height, with a very short tail, small rounded wings, and large powerful feet; the bill is of moderate length, straight and slender. The male has the upper part of the body dark brown, the throat and breast white, belly rusty. The

## Dipping Needle



Water Ousel.

dipper frequents streams, and feeds largely on water insects and larvæ.

**Dipping Needle**, or Inclination Compass, an instrument for showing the direction of one of the components of the earth's magnetism. In essentials the instrument consists of a light magnetized steel bar supported on a horizontal axis which passes, as nearly as possible, through the center of inertia of the bar. When a needle thus mounted is placed anywhere not in the magnetic equator, it dips or points downward; and if the vertical plane, in which it moves, coincides with the magnetic meridian the position of the needle shows at once the direction of two or more directions, found by making the experiment at different places, indicates the place of the magnetic pole.



Dipsas Cyandon.

**Dipsas**, a genus of Asiatic and tropical American non-venomous serpents of the family Colubridæ, of very elongated form. With the ancients it was a serpent whose bite was said to produce a mortal thirst.

Dip'tera, an order of two-winged insects, of which the common house-fly and blue-bottle are familiar examples.

<sup>•</sup> **Direc' trix**, in math. a line perpendicular to the axis of a conic section, and so placed that the distance from it of any point in the curve is to the distance of

the same point from the focus in a constant ratio; also, the name given to any line, whether straight or not, that is required for the description of a curve. The directrix of a parabola is a line perpendicular to the axis produced, and whose distance from the vertex is equal to the distance of the vertex from the focus.

Disc (disk), the central part of a radiate, compound flower surrounded by the ray. Also a part, sometimes cup-shaped, at the base of

## Distaff

the stamens, consisting in some cases of rudimentary stamens, in others of the modified receptacle In astronomy the term is applied to the face or circular figure exhibited by the sun, moon, or planet in the sky.

Dis' count, the charge made by a banker for interest of money advanced by him on a bill or other document, not presently due. In advancing money on such a security the banker deducts a charge for interest on his advance from the total amount represented on the security, pays the difference, which is called the proceeds of the bill, to the person parting with it, and collects the full amount to reimburse himself for outlay and interest at maturity. Popularly the term discount is applied to any deduction from the full amount of an account made by the party to whom it is paid, especially on prompt or early payment. When a bill which has been discounted is paid by the acceptor before it is due, the discount allowed for prepayment is called *rebate*.

**Dis'crase**, an ore of silver, consisting of antimony and silver. It occurs in hexagonal prisms, massive, disseminated, or granular.

**Dismal Swamp**, a large tract of marshy land in the U. S., beginning a little s. of Norfolk, in Virginia, and extending into North Carolina, containing 150,000 acres: 30 mi. long, from n. to s., and 10 broad. This tract was entirely covered with trees, with almost impervious brushwood between them, but it has now in part been cleared and drained. In the mildst of the swamp is a lake, called *Drummond's Pond*, 7 mi. in length. A navigable canal through the swamp connects Chesapeake Bay and Albemarle Sound.

**D'Israeli** (diz-rā'e-li), ISAAC (1766-1848), English man of letters, and father of the wellknown statesman, was b. at Enfield, Middlesex. An anonymous reply to Peter Pindar, entitled On the Abuse of Satire, was followed in 1701-1703 by the appearance of his Curiositics of Literature, the success of which determined much of his after work. His essay on the Literary Character was published in 1/05, and some time afterward a volume of romantic tales, The Lores of Mejnoun and Leila. Between 1612 and 1822 appeared his Calumities of Authors, Quarrels of Authors, and Inquiry into the Literary and Political Character of Janes I; the three being afterward published collectively under the title of Miscellanics of Literature. In 1823 appeared the commencement of his Life and Reign of Charles I, a work completed in 1831. The greater part of his life was passed in his library.

library. Dis taff, the first instrument employed in spinning. It consisted of a staff, on one end of which the wool or wax was rolled. The spinner held it in the left hand, and drew out the fibers with the right, at the same time twisting them. A small piece of wood called a spindle was attached to the thread, the weight of which carried it down as it was formed. When the spindle reached the ground the thread which had been spun was wound round it, and it was then again fastened near the beginning of the new thread. **Distemper**, in painting, a preparation of opaque color mixed in a watery glue, such as size, white of egg, or gum. It is used now chiefly in scene-painting and in paper for walls, but was employed in the higher departments of art before the introduction of oilpainting in the fifteenth century. Distemper is painted on a dry surface, fresco on wet mortar or plaster.

tar or plaster. Distillation, the volatilization and subsequent condensation of a liquid by a special apparatus, resulting in the separation of the liquid from a mixture. The operation is performed by heating the crude liquid or mixture in a retort or vessel known as the body of the still. This is made of various shapes and materials, and is closed with the exception of a siender neck, which opens into the condenser, a long tube through which the hot vapor from the still is passed. The tube is kept at a sufficiently low temperature to cause the vapor to condense, the common method of securing this being to surround the tube with a constantly renewed stream of cold water. In some cases ice or a freezing mixture may be required to effect condensation. On a large scale the condensing tube is coiled round and round in a tub or box, and is known as a *worm*. From the end of it the vapor condensed into a liquid drops or distils into a receiver. The simplest case of distillation is that of water containing solid matter in solution, the solid matter re-maining behind in the still or retort while the water trickles pure into the receiver. The cold water round the worm requires to be continually renewed, as otherwise it gets heated. When the mixture to be distilled consists of two or more fluids of different boiling points, such as alcohol and water, the more volatile comes off first, accompanied by a certain proportion of the vapor of the other, so that it is hardly possible completely to separate bodies by one distillation. This is effected by repeated successive distillations of the liquid with or without the addition of substances to retain the impurities. When the production of one of the ingredients only is aimed at by this process, it is called rectification, but when it is desired to separate and collect all the liquids present, or to divide a mixture into portions lying within certain ranges of temperature ascertained either by the thermometer or by the amount of liquor run off, or by the appearance of the distillate, etc., the process is called *frac*tional distillation. In the laboratory, distillation is employed for purifying water, for recovering alcohol and ether, for the preparation, purifi-cation, and separation of a great number of bodies. On the large scale, distillation is employed in the preparation of potassium, sodium, zine, mercury; of sulphuric acid, ether, chloroform, sulphide and chloride of carbon, essential oils and perfumes; purification of coal and wood tar, and the products obtained from them; and most extensive of all, the manufacture of whisky, brandy, or other spirit. Sea water is also distilled in many cases for drinking or cooking purposes. Destructive distillation differs from the preceding in this respect, that

the original substance is not merely separated into the bodies by the mixture of which it is formed, but is so acted on that it is completely decomposed, and bodies are produced which had no existence in the original matter. The term is restricted to the action of heat upon complex organic substances out of contact with the air. The products of destructive distilla-tion are numerous and varied. On the manufacturing scale the process is conducted sometimes for one part, sometimes for another part of the products. Coal, for example, is distilled primarily for the gas, but also for ammoniacal water, benzol, anthracene, and sometimes for the sake of the fixed carbon or coke, the volatile portions being neglected and practically wasted. Wood is distilled partly for the sake of the pyroligneous acid and the tar, partly for the charcoal. Bones are distilled for the sake of the charcoal, though the oil is also collected. Shale is distilled solely for the sake of the oil.

District of Columbia. See Columbia.

**Ditmarshes, a** district of Holstein, in Germany, consisting of a monotonous flat stretching along the German Ocean, between the mouths of the Elbe and the Eider, and so little raised above the sea as to require the protection of strong embankments. The area is 500 sq. mi., and the total pop. above 70.000.

Diu, an island of Hindustan belonging to the Portuguese. It was formerly the seat of a considerable commerce, but is now a place of no importance. Pop. 12,636.

Divers, birds remarkable for the habit of diving. The divers (Colymbidæ) are a family



of swimming birds (Natatores). characterized by a strong. streight. rather compressed. pointed. bill about as long as the head: a short and rounded tail; short wings; thin. compresse d legs, placed very far back, and the toes

Great Northern Diver.

completely webbed. They prey upon fish, which they pursue under water, making use partly of their wings, but chiefly of their legs and webbed feet in their subaqueous progression. The leading species are the great northern diver, the red-throated diver, and the black-throated diver. These birds inhabit the Arctic seas of the New and Old Worlds; they are abundant in the Hebrides, Norway, Sweden, and Russia. The great northern diver, loon, or ember-goose, is about 24 ft. long, and is of handsome plumage.

## **Dividing Range**

Dividing Range, Great, an Australian chain of mountains, forming the watershed between





Divers at Work.

the rivers flowing into the Pacific and those running westward. It is situated at an average distance of 30 mi. from the sea, though in some places it recedes as much as 60 mi., and stretches from Cape York on the north to Wilson's Promontory on the south. Culminating point Mount Townshend (7,353 ft.). **Divi-dlyi** (Libi-dibi or Libi-davi), the pods

**Divi-divi** (Libi-dibi or Libi-davi), the pods of *Casalpinia coriaria*, a tree which grows in tropical America, and a member of the family which yields sapan, brazil, and other red woods. The pods are about 1 in. broad and 3 in. long, but are generally bent or curled up; are excessively astringent, containing a large proportion of tannic and gallic acid, for which reason they are used by tanners and dyers.

Divination, the act of divining; a foretelling future events, or discovering things secret or obscure, by the aid of superior beings, or by other than human means. In ancient times and artificial. Natural divination was supposed to be effected by a kind of inspiration or divine afflatus; artificial divination was effected by certain rites, experiments, or observations, as by sacrifices, observation of entrails and flight of birds, lots, omens, position of the stars, etc. Among modes of divination were arinomancy, by axes: belomancy, by arrows; bibliomancy, by the Bible; oneiromancy, by dreams: pyromancy, by fire, etc.

Divine Right, the claim set up by some sovereigns or their supporters to the absolute obedience of subjects as ruling by appointment of God, insomuch that, although they may themselves submit to restrictions on their authority, yet subjects endeavoring to their sovereign's acts are considered guilty of a sin. This doctrine, so cele-

brated in English constitutional history, especially in the time of the Stuarts, may now be considered to be exploded.

Diving, the art or act of descending into water to considerable depths, and remaining there for a time. The uses of diving are important. particularly in fishing for pearls, corals, sponges, ex-amining the foundations of bridges, recovering valuables from sunken ships, and the Without the aid of like. artificial appliances a skillful diver may remain under water for two, or even three minutes; accounts of longer periods are doubtful or absurd. Various methods have been proposed and engines contrived to render diving more-safe and easy. The great object in all these is to furnish the diver with fresh air, without which he must either make but a

short stay under water or perish. Diving-bell, a contrivance for the purpose of enabling persons to descend and to remain

below the surface of water for a length of time, to perform various operations, such as examining the foundations of bridges, blasting rocks, recovering treasure from sunken vessels, etc. Divingbells have been made of various forms, more especially in that of a bell or hollow truncated cone, with the smaller end closed, and the larger one, which is placed lowermost, open. The air contained within these vessels prevents them from being filled with water on submersion, so that the diver may descend in them and breathe freely for a long time, provided he can be furnished with a new supply of fresh



Diving-bell, Inside and Top.

air when the contained air becomes vitiated by respiration. The diving-bell is generally made of cast iron, and has several strong convex lenses set in the upper side or roof, to admit light to the persons within. It is suspended by chains from a barge or lighter, and can be raised or lowered at pleasure upon sig-

# Diving-bell

#### **Diving-dress**

nals being given by the persons within, who are supplied with fresh air injected into a flexible pipe by means of forcing pumps placed in the lighter, while the heated air escapes by a cock in the upper part of the bell. The illustration shows the most recent form of diving apparatus in use on the river Clyde, in which steam is applied to operate all the movements required. A form, called the *nautilus*, has been invented which enables the occupants, and not the attendants above, to raise or sink the bell, move it about at pleasure, or raise great weights with it and deposit them in any



Diving-dress.

which has a corresponding screw, can be at-tached or removed. The helmet has usually three eycholes, covered with strong glass, and protected by guards. Air is supplied by means of a flexible tube which enters the helmet and То communicates with an air-pump above. allow of the escape of the used air there is sometimes another flexible tube, which is led from the back part of the helmet to the sur-face of the water. But in the more improved forms of the dress, the breathed air escapes by a valve so constructed as to prevent water from getting in, though it lets the air out. Leaden weights are attached to the diver, and his shoes are weighted, that he may be able to descend a ladder, walk about below, etc. Communication can be carried on with those above by means of a cord running between the diver and the attendants; or he may converse with them through a speaking tube or a telephonic apparatus. One form of diving-dress makes the diver independent of any connection with persons above the water. It is elastic and hermetically closed. A reservoir containing highly compressed air is fixed on the diver's back, which supplies him with air by a selfregulating apparatus at a pressure corresponding to his depth. When he wishes to ascend he simply inflates his dress from the reservoir. Another form, known as the Fleuss dress, makes the diver also independent of exterior aid. The helmet contains a supply of com-

desired spot. Divingdress, a waterproof dress made of india - rubber cloth used by professional divers, and covering the entire body except the head. The head. dress has a neck-piece or breastplate, fitted with a segmental screw bayonet joint, to which the head-piece or helmet, the neck o f

pressed oxygen, and the exhaled breath is passed through a filter in the breast-piece which deprives it of its carbonic acid, while the nitrogen goes back into the helmet to be mixed with the oxygen, the supply of which is under the diver's own control, and to be breathed over again. A diver has remained an hour and a half under 35 feet of water in this dress. The safe limit of depth at which operations can be carried on with the divingdress is 120 to 150 feet. Diving for pears, sponges, or corals is now to a great extent carried on by means of diving-dresses.

**Divining Rod**, a rod, usually of hazel, with two forked branches, used by persons who profess to discover minerals or water under ground. The rod, if carried slowly along by the forked ends, dips and points downward, it is affirmed, when brought over the spot where the concealed mineral or water is to be found. The use of the divining-rod is still common in many parts, and quite recently various wonderful instances of its efficacy in discovering water have been published in respectable prints.

Division of Labor, a principle employed in great industries for the simplification of the work to be done by each of the workmen engaged in it. The separation of complicated processes into a series of simple operations not only results in a great saving of time, but also demands much less ability on the part of the workman, in order that he may acquire the necessary skill in performing any particular operation. Owing to both of these causes, the saving of time, and the employment of cheaper labor, the cost of producing compli-cated articles is, by the application of this principle, immensely reduced. Division of labor tends to the invention of machinery, and to the effectual use of machinery when in-vented. It increases the skill and desterity of the individual workman; it effects a great saving of time and capital, and it conduces to the more economical distribution of labor by classing work-people according to their ca-pacity. It has, however, a deteriorating effect on the laborer's usefulness as an all-round workman.

DIX, JOHN ADAMS (1798-1879), statesman and soldier, b. in Boscawen, N. H.; d in New York City. In 1814 he became third lieutenant in the Twenty-third Infantry, and, in June, 1814. was transferred to the artillery. He was made first lieutenant in 1816; aide-de-camp to General Brown in 1819: was transferred to the First, then to the Third Artillery in 1821; and In 1826 he reappointed captain in 1825. signed his commission, studied law, and was admitted to the bar in 1828; was appointed secretary of state for New York in 1833; was elected to the state assembly in 1842; and U. S. senator in 1845; was assistant treasurer of the U.S. in 1853; postmaster of New York in 1859; and secretary of the treasury in Buchanan's cabinet in 1861. At the beginning of the Civil War he entered the army and was appointed brigadier general and major general of volunteers. In 1860 he was appointed minister to Paris; and in 1872, was elected governor of New York. He edited a literary journal, . The Northern Light; published various translations.

Dixie (or Dixie's Land), a term which came, by a popular error, to be identified with the South and Southern institutions during the Civil War. It is derived from a Northern negro refrain, which was sung in New York about the beginning of the nineteenth century, and which expressed the supposed regrets of the slaves of a man Dixie, who had shipped his slaves to the South as the abolition sentiment grew stronger. This rude chant afterward was developed into the melody that for a time became the rival of Yankee Doodle.

Dixon, Lee co., Ill., on Rock\*River, 98 mi. from Chicago. Railroads: C. & N. W., and Illinois Central. Industries: piano, shoe, box, sash and blind, and woven-wire factories, planing mill, and condensed-milk factory. Surrounding country agricultural. Dixon was the base of supplies during the Black Hawk War. The town was first settled in 1828 by John Dixon. Pop. est. 1897, 10,000.

Dizful, a town of Persia, near the western boundary, on the river Dizful; a place of great trade and manufactures. Pop. 30,000.

Djokdjokarta, a Dutch residency in the Its forests abound in teak. island of Java. Its natural fertility is great, and rice, coffee, and tobacco are extensively cultivated. It is ruled by a sultan who is dependent on the Dutch. Pop. 441,800. The town is large and regular, and contains the sultan's water-palace, and the seat of the Dutch resident, which is a fort commanding both the palace and the town. Pop. 45,000.

Dnieper (në'per), a great river of Russia which rises in the government of Smolensk, flows first southwest, then southeast, and latterly again southwest to the Black Sea. It begins to be navigable a little above Smolensk, and has a total length, including windings, of 1,230 mi. Among its tributaries are the Beresina, the Pripet, the Desna, and the Psiol. In its lower course there are important fisheries. Between Kiev and Alexandrovsk it forms a series of cataracts, which are now being removed by blasting of the rocks. Since 1838 there have been steamboats on the river, and the trade carried on by it is considerable.

**Dniester** (nës'tèr), a large river of Europe, which has its source in the Carpathian Mountains, in Austrian Galicia, enters Russia at Chotin, and empties itself into the Black Sea, after a course of about 750 mi. Its navigation is difficult on account of frequent shallows and rapids.

Doane, George WASHINGTON (1799-1859), American bishop, b. in New Jersey. He took a great interest in educational matters; taught in Trinity College, Hartford, and, in 1846, founded Burlington College.

Dobrud'sha, THE, a territory forming part of the kingdom of Roumania, included between the Danube, which forms its boundary on the w. and n., the Black Sea on the e., and on the s. by a line stretching from Silistria to

a point a few miles s. of Mangalia. There are some fertile spots, but on the whole it is marshy and unhealthy. The population is of various nationalities, Roumanians, Bulgars, Greeks, Turks, and Jews. The inhabitants support themselves by rearing sheep and buffaloes. The principal town is Babadagh. Pop. about 100,000.

Dock, a name applied to different plants of the genus Rumer, belonging to the rhubarb family. These are large herbaceous plants, with stout roots, alternate and often entire leaves, and bearing panicles of small, greenish flowers. They are very troublesome as weeds, but the roots of some of them are used medicinally as astringents.

**Docks** are usually artificial enclosures for the reception of vessels, and provided with gates to keep in or shut out the tide. They are called *wet-docks* when they are intended to receive vessels for loading and unloading, the gates being in this case constructed so as to keep in the tide, and thus preserve the water within the docks as nearly as possible at the uniform level of high water. They are called dry-docks, or graving-docks, when they are intended to admit vessels to be examined and repaired, the gates in this case being such as to keep out the tide while the shipwrights are engaged on the vessel. There is another kind of dry-docks called floating-docks, which float on the surface of the water, and may be sunk sufficiently to allow of a vessel being floated into them, and then raised again, by pumping the water out of the tanks round the sides. One of the chief uses of a wet-dock is to keep a uniform level of water, so that the business of loading and unloading ships can be carried on without any interruption and without danger of damage to the vessel from straining, low tides, storms, etc.

Graving-docks are built of strong masonry, and their entrance is closed either by swinging gates opening in the middle, and when shut presenting a salient angle to the water in the river or harbor from which the dock is entered, or by a framework called a caisson, built like the hull of a ship, with a keel and a stem at both ends. When the caisson is empty it floats, and may be removed to admit of a vessel being floated into the dock. The caisson being then placed at the entrance and filled with water, again sinks into the grooves intended for it and closes the graving-dock. The water is then pumped out, leaving the ship dry and supported by wooden blocks and props. With regard to floating docks, a common type of construction is the iron floating-dock, built in water-tight compartments, and not closed in at either end. It is sunk to the required depth by the admission of water into so many of the compartments, till the vessel to be docked can float easily above its bottom, and it is then raised by pumping out the water until the ship can be propped up as in a drydock.

A kind of dry-dock, called the hydraulic liftdock, consists of a double row of iron columns, each of which contains a hydraulic press. All

these hydraulic presses can be worked simultaneously by a powerful steam engine, and their combined action has the effect of raising a series of transverse iron girders stretching from the columns on one side to those of the other. An iron pontoon is first floated above these girders, and then sunk so as to rest on them,



Floating-dock.

and the ship to be docked is floated above the pontoon, and supported by blocks resting only upon the pontoon, so that the ship is in no way connected with the columns on each side. The hydraulic presses are then set to work, the girders with the pontoon and ship are raised high enough for the water to be run out of the pontoon, which is then sufficiently buoyant to float the ship. The pontoon may now be floated away clear of the dock, and another take its place. By this plan a number of vessels can be floated for overhauling and repairs in very shallow water and at comparatively slight expense.

**Dock-yards**, establishments supplied with all sorts of naval stores, materials and conveniences for the construction, repairs, and equipment of ships of war. In the U. S. there are nine important navy-yards, located at Brooklyn, N. Y.; Boston Mass.: Portsmouth, N. H.; League Island, Pa.; Portsmouth, Va.; Mare Island, Cal.; New London, Conn.; Pensacola, Fla.; and at Washington, D. C.

**Doctrinaires**, a section of French politicians, represented by the Duke de Broglie, Royer-Collard, Guizot and others who became prominent after the Restoration in 1815. They favored a constitutional monarchy with a balance of power similar to that which then existed in Britain. In the chambers they thus occupied a place between radicals and ultraroyalists. They received the name of *doctrinaires* because they were looked upon more as theoretical constitution-makers than practical politicians, and the term is now used to designate political theorists generally. **Dodge**, AUGUSTUS CÆSAR (1812-1883), b. in Missouri. He was one of the first U. S. senators from Iowa, sitting from 1848 to February, 1855, and was minister to Spain 1855-59. In 1873 he became mayor of Burlington.

Dodge, GRENVILLE MELLEN, b. in Danvers, Mass., April 12, 1831; served with distinction

in the Civil War, and in December, 1864, succeeded General Rosecrans in command of the Department of Missouri. In 1866 he became chief engineer of the Union Pacific railroad, of which he has been many years a director. He served a term in Congress from Iowa, 1868-69.

from Iowa, 1868–69. Dodge, HENRY (1782–1867), soldier, b. in Indiana. He fought in the Black Hawk War, and obtained a colonelcy in the regular army. In 1836 he was made governor of the territory of Wisconsin, and later served two

terms as delegate in Congress. In 1846 he again became governor, and was U. S. senator from the state of Wisconsin from 1848 to 1857.

**Dodge**, MARY MAPES, b. in New York City in 1838; has written extensively for the magazines, and in 1873 became editor of *St. Nicholas.* 

**Dodo** (*Didus Ineptus*), an extinct genus of birds once abundant on the Island of Mauritius, and assigned by naturalists to the order Columbæ, or pigeons, though an extreme modification of the type. It was a massive, clumsy



Supposed Figure of the Dodo.

bird, larger than a swan, covered with down instead of feathers, with short, ill-shaped legs, a strong, bulky, hooked beak, and wings and tail so short as to be useless for flight. Its extinction was due to its organization not being adapted to the new conditions which colonization and cultivation introduced.

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**Dodo na**, a celebrated locality of ancient Greece, in Epirus, where was one of the most ancient Greek oracles. It was a seat of Zeus, whose communications were announced to the priestesses in the rustling of the leaves on its oak-tree, and the murmuring of water which gushed forth from the earth.

Dog, a digitigrade, carnivorous animal. forming the type of the genus Canis, which includes also the wolf, the jackal, and, as a sub-genus, the fox. The origin of the dog is a much-debated question, some considering the breed derived from the wolf, an opinion which is based on resemblances of structure, the susceptibility which the wolf shows of being domesticated, the fact of the two animals breeding together and producing fertile young, and the equality in the period of gestation. But all these points are subject to exceptions and reservations which make the matter doubtful. It is generally agreed that no trace of the dog is to be found in a primitive state, the dhole of India, and dingo of Australia being believed to be wild descendants from domesticated ancestors. Several attempts to make a systematic classification of the varieties of dogs have been made but without much success, it being difficult in many cases to determine what are to be regarded as types, and what as merely mongrels and crossbreeds. Colonel Hamilton Smith divides dogs into six groups as follows: 1, Wolf-dogs, including the Newfoundland, Esquimaux, St. Bernard, shepherd's dog, etc.; 2, Watch-dogs and Cattle-dogs, including the German boar-hound, the Danish dog, the matin dog, etc.; 3, Greyhounds, the lurcher, Irish hound, etc.; 4, Hounds, the bloodhound, staghound, foxhound, setter, pointer, spaniel, cocker, poodle, etc.; 5, Curdogs, including the terrier and its allies; 6, Mastiffs, including the different kinds of mastiffs, bull-dog, pug-dog, etc. Dogs have in the upper jaw six incisors, two strong curved canines, and six molars on each side, the first three, which are small and have cutting edges, being called false molars; in the lower jaw are six incisors, two canines, and on each side seven molars. The forefeet have five toes, the hindfeet four or five; the claws are strong, blunt, and formed for digging, and are not retractile. The tail is generally long, and is curled upward. The female has six to ten mammæ; she goes with young nine weeks as a rule. The young are born blind, their eyes opening in ten or twelve days; their growth ceases at two years of age. The dog commonly lives about ten or twelve years, at the most, twenty.

**Dogbane**, an American plant found from Canada to Carolina, belonging to the natural order Apocynaceæ. The whole plant is milky; the root is intensely bitter and nauseous, and is employed in America instead of ipecacuanha. Another species yields a useful fiber, and is known as Canada or Indian hemp.

**Dog days**, the name applied by the ancients to a period of about forty days, the hottest season of the year, at the time of the heliacal rising of Sirius, the dog-star. The time of the

#### Dogma

rising is now, owing to the precession of the equinoxes, different from what it was to the ancients (July 1); and the dog days are now counted from July 3 to August 11, that is, twenty days before and twenty days after the heliacal rising.

**Doge** (döj), formerly the title of the first magistrates in the Italian republics of Venice and Genoa. The first doge of Venice elected for life was Paolo Anafesto, in 697; and in Genoa, Simon Boccanera, in 1339. In the former city the dignity was always held for life; in the latter, in later times, only for two years. In both cities the office was abolished by the French in 1797.

**Dogfish,** a name given to several species of small shark, common around the British Isles. The rough skin of one of the species, the lesser spotted dogfish, is used by joiners and other artificers in polishing various substances, particularly wood. This species is rarely 3 ft. long. S. canicula, the greater dog-



Lesser Spotted Dogfish.

fish, is in length from 3 to 5 ft. It is blackish brown in color, marked with numerous small dark spots. Both species are very voracious and destructive. Their fiesh is hard, dry, and unpalatable. The common or picked dogfish is common in North American seas, aud is sometimes used as food. It is fierce and voracious.

**Dogger-Bank**, an extensive sand bank of the German Ocean, celebrated for its cod fishery. It commences about 36 mi. e. of Flamborough Head and extends e. n. e. to within 60 mi. of Jutland, in some places attaining a breadth of about 60 mi., though it terminates merely in a point. Where shallowest the water over it is 9 fathoms.

**Dog lichen,** the popular name of a plant, common on damp ground, stones, and trunks of trees. It was formerly supposed to be a specific for hydrophobia. Also known as *Ash*colored Ground Literwort.

**Dogma**, an article of religious belief, one of the doctrines of the Christian faith. The history of dogmas, as a branch of theology, exhibits in a historical way the origin and the changes of the various Christian systems of belief, showing what opinions were received by the various sects in different ages of Christianity, the sources of the different creeds, by what arguments they were attacked and supported, what degrees of importance were attached to them in different ages, the circumstances by which they were affected, and the mode in which the dogmas were combined into systems. Lectures on this subject are common in the German universities.

**Dog's Cabbage** (Dog-cabbage), a smooth succulent herb, nat. order Chenopodiaceæ, found in the s. of Europe. Though it is slightly acrid and purgative it is sometimes used as a pot herb.

**Dog's-tooth Ornament,** an architectural ornament or molding consisting of square fourleaved flowers with projecting centers placed in close contact with each other. It is the characteristic decorated molding of early English architecture.

**Dog's-tooth Violet**, a liliaceous plant grown in gardens, so called from the appearance of its white bulbs.

**Dogwatch**, a nautical term distinguishing two watches of two hours each (4 to 6 P. M. and 6 to 8 P. M.). All the other watches count four hours each, and without the introduction of the dogwatches the same hours would always fall to be kept as watch by the same portion of the crew.

**Dol' drums,** among seamen, the parts of the ocean near the equator that abound in calms, squalls, and light baffling winds; otherwise known as the horse-latitudes.

**Dol'ichos** (-kos), a genus of leguminous plants, sub-order Papilionaceæ. They are found in the tropical and temperate regions of Asia, Africa, and America, and all produce edible legumes.

**Dol'ichosaurus** ("long lizard"), an extinct snake-like reptile found in the chalk, whose remains indicate a creature of aquatic habits from 2 to 3 ft. in length.

**Dollar,** a silver or gold coin of the U. S., of the value of 100 cents. The same name is also given to coins of the same general weight and value, though differing somewhat in different countries, current in Mexico, a great part of South America, Singapore, the Philippine Islands, etc. The name is from the Dutch (also Danish and Swedish) daler, from German thaler, so named from German thal, a dale, because first coined in Joachim's Thal, in Bohemia, in 1518.

**Dollart,** THE, a gulf of the German Ocean, at the mouth of the Ems, between the Dutch province of Groningen and Hanover. It was originally dry land, and was formed by irruptions of the sea which took place in 1277 and 1530, overwhelming thirty-four large villages and numerous hamlets.

**Döllinger** (deul'ing-èr), JOHANN JOSEPH IG-NAZ (1799-1890), a celebrated German theologian and leader of the Old Catholic party, was b. at Bamberg, in Bavaria. In 1822 he entered the church, and soon after published *The Doc*trine of the Eucharist during the First Three Centuries, a work which won him the position of lecturer on church history at the University of Munich. In later years he took an active part in the political struggles of the time as representative of the university in the Bavarian Parliament, and as delegate at the Diet of Frankfort voted for the total separation of church and state.

**Dolomite**, a mineral, also called magnesian limestone. It is composed of carbonate of calcium and carbonate of magnesium, and varies from gray or yellowish-white to yellowishbrown. It abounds in the Apennines, Tyrol. Switzerland, Tuscany, North America. etc.. and in England extends from South Shields to Nottingham. A variety called bitter spar. and sometimes *rhomb spar*, is found in crystals having the form of a rhomboid; color. grayish, yellowish, or reddish brown, easily scratched with the knife; semi-transparent. A second variety is denominated *pearl spar*. which has crystals of curvilinear faces and a pearly luster.

**Dolomite Mountains** (or Dolomite Alps). a group of European mountains belonging partly to Tyrol, partly to North Italy, and having the Piave and Rienz on the east, the Adige and Eisack on the west. They arnamed from the prevalence of the mineral dolomite, and present most interesting and picturesque scenery, the peaks being endlessly varied in form. The highest summits are Palle di San Martino (10.958 ft.); Sorapiss (10,798), and Monte Tofana (10,715).

**Dolphin** (*Delphinus*), a cetaceous animal forming the type of a family (Delphinidæ). which includes also the porpoises and narwhal. Dolphins are cosmopolite animals, inhabiting every sea from the equator to the poles; they are gregarious, and swim with extraordinary velocity. The common dolphin



Common Dolphin.

measures from 6 to 10 ft. in length, has a long, sharp shout with numerous nearly conical teeth in both jaws; its fiesh is coarse. rank, and disagreeable, but is used by the Laplanders as food. It lives on fish, mollusca. etc., and often may be seen in numbers round shoals of herring. The animal has to come to the surface at short intervals to breathe. The blow-hole is of a semilunar form, with a kind of valvular apparatus, and opens on the vertex. nearly over the eyes. The structure of the ear renders the sense of hearing very acute, and the animal is observed to be attracted by regu

lar or harmonious sounds. One or two young are produced by the female, who suckles and watches them with great care and anxiety, long after they have acquired considerable size. Compactness and strength are the characteristics of the genus. The name is also commonly but improperly given to a fish, a member of the mackerel family, the beauty of whose colors when dying has been much celebrated by poets. They abound within the tropics, are about 4 or 5 ft. long, very swift in swimming, and are used as food, though said sometimes to be poisonous.

Dome, a vaulted roof of spherical or other curvature, covering a building or part of it, and forming a common feature in Byzantine and also in Renaissance architecture. Cupola is also used as a synonym, or is applied to the interior, dome being applied to the exterior. Most modern domes are semi-elliptical in vertical section, and are constructed of timber: but the ancient domes were nearly hemispherical and constructed of stone. Of domes the finest, without any comparison, ancient or modern, is that of the Rotunda or Pantheon at Rome (1421 ft. internal diameter and 143 ft. internal height), erected under Augustus, and still perfect. Among others the most noteworthy are St. Sophia at Constantinople (104x201 ft.), the cathedral of Santa Maria del Fiore at Florence (189x310 ft.), St. Peter's at Rome (139x330 ft.), St. Paul's, London (112x215 ft.), the Hotel des Invalides (80x173 ft.), and the church of St. Geneviève at Paris (67x190 ft.) The figures represent the internal diameter and height in feet. The finest dome in the U.S. is that of the Capitol at Washington, built of cast-iron.

**Domenichino** (dö-men-i-kē'nö) (1581-1641), *Domenico Zampieri*, an Italian painter of great eminence, of the Lombard school, b. at Bologna. He studied under Annibal Carracci, and afterward went to Rome, where he became painter to Pope Gregory XV. Among his best works are the *Communion of St. Jerome* in the Vatican Museum, the *History of Apollo*, the *Martyrdom of St. Agnes*, and the *Triumph* of Darid.

**Domin'go**, SAN, capital of the Dominican Republic (or San Domingo) in the island of Hayti. It lies on the s.e. coast at the mouth of the Ozama, and has a commodious port. It is the oldest European city in the New World, having been founded in 1494 by Bartholomew Columbus. Pop. about 16,600.

Columbus. Pop. about 16.000. **Dominica** (dom-i-nē'kà). a British West India island, so named because discovered by Columbus on a Sunday, a member of the united colony of the Leeward Islands between Martinique and Guadeloupe. It is about 20 mi. in length, n. to s. and 12 mi. in breadth e. to w; area 186.436 acres. It is rugged and mountainous, but it contains many fertile valleys and is well watered. The shores are but little indented, and are entirely without harbors, but on the west side there are several good anchorages and bays. The principal exports consist of sugar, molasses, coccoa, and lime-juice. The imports and exports amount each to about \$250,000 annually. Dominica was ceded by France to Great Britain in 1763. Roseau is the capital. Pop. 28,211 (including about 300 aboriginal Caribs).

Domin' ical Letter, in chronology, properly called Sunday letter, one of the seven letters of the alphabet, A B C D E F G, used in almanacs, ephemerides, etc., to mark the first seven days of the year and all consecutive sets of seven days to the end of the year, so that the letter for Sunday will always be the same. If the number of days in the year were divisible by seven without remainder, then the year would constantly begin with the same day of the week; but as it is, the year begins and ends on the same day, and therefore the next year will begin on the day following, and on leap years two days following, so that the same series is not repeated till after four times seven, or twenty-eight years.

**Dominican Republic** (or San Domingo), a republic occupying the eastern portion of the island of Hayti; area 20,506 sq. mi. It is fertile and exports mahogany, sugar, tobacco. cocoa, etc., but its resources are as yet but little developed. It formerly belonged to Spain, and is the oldest colonial settlement in America. Its inhabitants are chiefly negroes and mulattoes. Capital, San Domingo. Pop. est. at 504,000. See *Hayti*.

**Dom' incoes**, a game played with small flat rectangular pieces of ivory, about twice as long as they are broad. They are marked with spots varying in number. When one player leads by laying down a domino, the next must follow by placing alongside of it another which has the same number of spots on one of its sides. Thus, if the first player lays down 6-4. the second may reply with 4-8, or 6-7, etc.; in the former case he must turn in the 4, placing it beside the 4 of the first domino, so that the numbers remaining out will be 6-8; in the latter case he must turn in the 6 to the 6 in like manner, leaving 4-7, to which his oppo-nent must now respond. The player who cannot follow suit loses his turn, and the object of the game is to get rid of all the dominoes in hand, or to hold fewer spots than your opponent when the game is exhausted by neither being able to play.

**Domitian** (or in full, Titus Flavius Domitianus Augustus (A. D. 51-96), Roman emperor. son of Vespasian, and brother of Titus; in 81 succeeded to the throne. At first he ruled with a show of moderation and justice, but soon returned to the cruelty and excesses for which his youth had been notorious.

**Domremy la Pucelle** (don-ré-mi lå pu-sål), the birthplace of Joan of Arc, a small French village, department of the Vosges, 7 mi. n. of Neufchâteau. The house is still shown here in which the heroine was b., and in the neighborhood is the monument erected to her memory.

**Don** (ancient *Tanais*), a river of Russia, which issues from Lake Ivan-Ozero, in the government of Tula, and flows s.e. through governments Riazan, Tambov, Voronej, and Don Cossacks, to within 37 mi. of the Volga, where it turns abruptly s.w. for 236 mi., and falls into the Sea of Azof; whole course nearly 900 mi. The chief tributaries are: right bank, the Donetz and Voronej; left, the Khoper and Manitsch. Although not admitting vessels of much draught, the Don carries a large traffic especially during the spring floods, and a canal connects it with the Volga system of navigation. It has also very extensive and productive fisheries.

**Dona'ti's Comet**, so called from the Italian astronomer Donati, who first observed it in June, 1858. Next to the comet of 1811 it is the most brilliant that has appeared this century. It was nearest the earth on Oct. 10, 1858.

**Donax**, a species of grass or reed inhabiting the southern parts of Europe; it grows to a great height and is used for fishing-rods, etc.

**Don' caster**, town of England, West Riding of Yorkshire. It has manufactures of ropes, canvas, machinery, etc. It has been long celebrated for its annual races, now held in the middle of September. Doncaster was originally a Roman station on the line of the old Roman Watling Street. Pop. 25,938.

**Dondrah Head**, the southern extremity of the island of Ceylon. It was the site of the Singalese capital during part of the seventh century, numerous remains of which are still to be found.

**Don'egal**, a maritime county, Ireland, province of Ulster: area 1,197,154 acres. The fisheries are extensive and valuable, and form the chief employment of the inhabitants of the coast and islands. Grain, butter, and eggs are exported. The minerals include marble, lead, copper, etc., but are not wrought to advantage. Pop. 185,211. Donegal, the county town, is a small seaport on the bay of the same name, at the mouth of the river Esk. Pop. 1,416.

**Dongola**, a district of Upper Nubia, Egypt, on both sides of the Nile. It formerly belonged to Egypt and was the seat of a pasha, but since the evacuation of all the country south of Wada Haifa in 1886 by the Egyptian government, has been left in an unsettled state. Its chief products are dates, cotton, indigo, and maize. The population is a mixture of Arabians and indigenous Nubians. Its chief town is Dongola (or *El Ordek*), on the left bank of the Nile. Pop. 6,000.

**Doniphan**, ALEXANDER WILLIAM (1808–1887), soldier, b. in Mason co., Ky. He graduated at Augusta College in 1824, was admitted to the bar in 1830, and began to practise in Lexington, Mo. He was elected to the legislature in 1836, 1840, and 1854. In 1838, when the state militia was summoned out against the Mormons, he commanded the first brigade, and captured Joseph Smith, who escaped, joined his band in Illinois, and afterward called Dr. Doniphan to act as his counsel. He was made colonel of a regiment of mounted veterans equipped for the army of the West, at the beginning of the War with Mexico in 1846. He was a commissioner from Missouri to the Peace Convention in Washington, which endeavored to avert the Civil War.

Donizet 'ti, GAETNO (1798-1848), Italian com-

poser. In 1835 he was appointed professor of counterpoint at the Royal College of Naples, but removed in 1840 to Paris, bringing with him three new operas, Les Martyre, La Farrita, and La Fille du Régiment, of which the last two are among his most popular productions. Of his other operas none except Linda di Chamouni and Don Pasquale achieved any special triumph. He had written as many as sixty-four operas.

Don Juan (Sp. pron. hy-in'), the hero of a Spanish legend which seems to have had some historical basis in the history of a member of the noble family of Tenorio at Seville. According to the legend Don Juan was a libertine of the most reckless character. An insult to the daughter of a governor of Seville brought the indignant father and the profigate don into deadly conflict, in which the former was slain. Don Juan afterward, in a spirit of wild mockery, goes to the grave of the murdered man and invites the statue of him erected there to a revel. To the terror of Don Juan the "stony guest" actually appears at the table to bear him away to the infernal world. The legend has furnished the subject for many dramas and operas. The most fa-mous of the latter is Mozart's Don Gioranni which has made the story familiar to everybody. Among the former are Burlador de s-rilla by Tellez, Don Juan ou Le Festin de Pierre. by Molière, and The Libertine by Shadwell. The Don Juan of Byron bears no relation to the old story but in name and in the libertine character of the hero.

**Donnelly**, IGNATIUS, b. in Philadelphia. Nov. 3, 1831, and studied law. In 1857 he went to Minnesota, became lieutenant governor in 1859, and Congressman from December, 1863. to March, 1869.

**Donnybrook**, a village, Ireland, now mostly in the parliamentary borough of Dublin. Its famous fair, which seldom passed off without riot and bloodshed, was abolished in 1855.

**Don Quixote** (Sp. pron.  $k\bar{e}-\hbar\bar{o}$ 'tā), the title of a famous romance by Cervantes. See (*ir*rantes. The name of the hero, Don Quixote is used as a synonym for foolish knight-errantry or extravagant generosity.

**Doolittle**, JAMES Rood, b. in Washington co., N. Y., 1815: was admitted to the bar in 1837, and removed to Wisconsin in 1851. He became circuit judge in 1853, and from 1857 to 1869 was U. S. senator. He has since practised law in Chicago. In 1872 he presided at the Democratic convention in Baltimore, which endorsed Horace Greeley for the presidency.

**Doomsday** (or Domesday) **Book**, a book containing a survey of all the lands in England. compiled in the reign and by the order of William the Conqueror. The survey was made by commissioners, who collected the information in each district from a sworn jury consisting of sheriffs, lords of manors, presbyters, bailiffs, villeins—all the classes, in short, interested in the matter. The extent, tenure, value, and proprietorship of the land in each district, the state of culture, and in some cases the number of tenants, villeins, serfs, etc., were the matters chiefly recorded. The survey was completed within a year. Northumberland, Durham, Cumberland, and Westmoreland were not included in the survey, probably for the reason that William's authority was not then (1086) settled in those parts. The Domesday Book consists of two volumes, one folio and one quarto. It has been twice republished, the last time (1861-65) in perfect facsimiles of the original.

**Dordogne** (dor-dony), a department of France, which includes the greater part of the ancient province of Périgord, and small portions of Limousin, Angoumois, and Saintonge. Area 3,544 sq. m., of which about a third is fit for the plow. The chief minerals are iron, which is abundant, slate, limestone, marble, and other stone. Mining, iron manufacture, etc., are carried on to a considerable extent, and there are a number of vineyards. The climate is mild, but somewhat changeable. Pop. 492,205. The river DORDOGNE, principal river of the department, rises on the flanks of the Puy-de-Sancy, flows w.s.w., and after a course of 290 miles unites with the Garonne in forming the Gironde.

**Doré** (dö-rā) PAUL GUSTAVE (1833-1883), a prolific French draftsman and painter, b. at Strasbourg. He distinguished himself greatly as an illustrator of books. His illustrations of Rabelais, of Perrault's Tales, Sue's Wandering Jew, Dante's Divina Commedia, and Cervantes's Don Queixote, displayed great fertility of invention, and the fine fantasy of his landscapes and the dramatic effectiveness of his groups acquired for him a European reputation.

**Doria**, one of the most powerful families of Genoa, became distinguished about the beginning of the twelfth century, and shared with three other leading families, the Fieshi, Grimaldi, and Spinola, the early government of the republic (1284-1500).

**Dorians,** one of the four great branches of the Greek nation who migrated from Thessaly southward, settling for a time in the mountainous district of Doris in Northern Greece and finally in Peloponnesus.

**Doric Order**, in architecture, is the oldest, strongest, and simplest of the three Grecian orders, and the one that is best represented among the remains of ancient Greek architecture. The Doric column is distinguished by its want of a base (in the more ancient examples, at least), by the small number of its flutings and by its massive proportions, the true Grecian Doric having the height of its pillars six times that of the diameter. The capital was small and simple, and the architrave, frieze, and cornice were rather plain and massive.

**Dormant State**, a state of torpidity in which certain animals pass a portion of the year. In cold and temperate climates this period of long sleep takes place during the winter months, and is properly called *hibernation*. It commences when the food of the animal begins to get scarce, continues for a longer or shorter period, and is deeper or lighter according to the habits and constitution of the animal

Bats, bears, some animals of the rodent order, such as the porcupine, the dormouse, the squirrel, etc., all the animals belonging to the classes of Amphibia and Reptilia, such as tortoises, lizards, snakes, frogs, etc., and many species of molluscs and insects, hibernate more or less completely, retiring to suitable places of concealment-the bat to dark caves, the hedgehog to fern-brakes, snakes to holes in trees, etc. During hibernation there is a great decrease of heat in the bodies of the animals. The respiration as well as the pulsation of the heart is exceedingly slow, and the irritability of the animal often so low that in some cases it can be awakened only by strong electric shocks. With frogs and amphibious reptiles the dormant state is very common, and if the temperature is kept low by artificial means they may remain dormant for years. The term æstiration has been used to describe a similar condition into which certain animals, such as serpents and crocodiles, in tropical countries pass during the hottest months of the year.

**Dormouse**, a genus of mammiferous quadrupeds, of the order Rodentia. These little animals, which appear to be intermediate between the squirrels and the mice, inhabit temperate and warm countries, and subsist entirely on vegetable food. Their pace is a kind of leap, but they have not the activity of squir-



Dormouse.

rels. While feeding they sit upright and carry the food to their mouth with their paws. The dormice pass the winter in a lethargic or torpid state, reviving only for a short time on a warm sunny day, when they take a little of their hoarded stores and then relapse into the dormant state. They bring forth three or four at a birth.

**D'Orsay**, ALFRED, COUNT (1798-1852). a dilettante artist and man of fashion. When a young man he visited England. He married a daughter of the Earl of Blessington, but after the earl's death, a separation took place, and D'Orsay became an inmate of the Gore House, which the Countess of Blessington had made the center of a famous literary coterie.

made the center of a famous literary coterie. Dorsey, STEPHEN W., b. in Vt., Feb. 28, 1842: served during the Civil War. He went to Arkansas in the "carpet bag" times, and 44

sat as U. S. senator from that state from 1873 to 1879.

**Dorset**, DORSETSHIRE, a maritime county in the south of England, area 627,265 acres. A great part of the county is grass, and dairy husbandry is extensively carried on. Neither coal nor ores of any kind are found, but the quarries yield the well-known Portland stone. Pipe clay, plastic clay, and potter's clay also abound. The principal manufactures are those of flax, canvas, duck, etc., also silk and woolens. Pop. 194,487.

**Dort**, (or Dordrecht), a town, Holland, province South Holland, 14 mi. n.e. Rotterdam, on the Merwede, an arm or part of the Maas, and on an island separated from the mainland by an inundation in 1421. It is an old town, with a fine Gothic church, a good townhouse, museum, etc. It was formerly of more importance than now, but it still carries on an extensive trade, being not only near the sea, but by the Rhine, the Maas, and other water communications, connected with an immense extent of land territory. Pop. 31,067.

**Dort'mund**, a city of Prussia, province of Westphalia, situated on the Ems, 47 mi.n.n.e.of Cologne. It has rapidly increased in recent years, its prosperity being due to its becoming the center of several important railway systems, to the opening of extensive coal mipes in the vicinity, and to the active manufactures of iron, steel, machinery, railway plant, etc. There are also a number of breweries, potteries, tobacco factories, chemical works, etc. It was once a free imperial Hanseatic town, and the seat of the chief tribunal of the Vehme. Pop. 78,435.

**Dory** (or John Dory) (*Zeus faber*), a fish belonging to the mackerel family, celebrated for



#### John Dory.

the delicacy of its flesh. It seldom exceeds 18 in. in length, and is yellowish-green in color with a blackish spot on each side.

**Dot'terel**, a species of plover which breeds in the north of Europe, and returns to the south for the winter. In Scotland it appears in April and leaves in August, the young being hatched in July. It is found all over Europe and Northern Asia. Several species are

represented in the U.S., including the golden plover, the kill-deer, and piping plover.



Dotterel.

**Doual** (dö'ā) (or Douay), a town in France, department Nord, on the Scarpe, 18 mi. s. of Lille. It is one of the oldest towns in France, of which it became a part by the Treaty of Utrecht. It is strongly fortified, has a fine townhouse, several handsome churches, an academy of arts and law, a lyceum, museum and public library, Benedictine college, hospital, etc. ; a cannon foundry, linen manufactories, machine works, tanneries, etc. Pop. 30,-030.

**Doual Bible**, the English translation of the Bible used among English-speaking Catholics, and executed by divines connected with the English College at Douai. The New Testament was published in 1582 at Rheims, the Old in 1609-10 at Douai, the translation being based on the Vulgate. Various revisions have since materially altered it.

**Double-eagle**, an American gold coin of the value of 20 dollars, so called because double the value of the coin called the eagle.

**Double-stars** (or Binary Stars), stars which are so close together that they appear as one to the naked eye, but are seen to be double when viewed through a telescope. One of these stars may revolve about the other, or both may revolve round a common center.

**Doubs** (do), a department of France, having Switzerland on its eastern frontier. Its surface is traversed by four chains of the Jura. The temperature is variable, and the climate somewhat rigorous. About a third of the land is arable, but much the greater part is covered with forests. Maize, potatoes, hemp, flax, are the principal crops. Much dairy produce is made into Gruyère cheese. The minerals include iron, lead, and marble. Pop. 310,963.

**Douglas** (dug'las), capital of the Isle of Man, is frequented by immense numbers of visitors during the summer. Among the objects of interest are the House of Keys, the customhouse, the extensive breakwater, the promenade, etc. Pop. 15,500.

**Douglas** (dug'las), a family distinguished in the annals of Scotland. Their origin is unknown. They were already territorial magnates at the time when Bruce and Baliol were competitors for he crown. As their estates

lay on the borders they early became guardians of the kingdom against the encroachments of the English.

Douglass, FREDERICK (1817-1895), American lecturer and journalist, was the son of a negro slave, and was b. at Tuckahoe in Maryland. Although his father was a white man, he was, according to the law, reared as a slave. In 1832 he was purchased by a Baltimore shipbuilder, but made his escape in 1838. As he had taught himself to read and write, and showed talent as an orator, he was employed by the Anti-slavery Society as one of their lecturers. In 1845 he published his autobiography, and afterward made a successful lecturing tour in England. In 1870 he started a journal entitled The New National Era; in 1871 he was appointed secretary of the commission to Santo Domingo; in 1872, presidential elector; in 1877, marshal for the District of Columbia; recorder of deeds for that district, 1881-86; and U.S. Minister to Hayti in 1890.

**Douglas,** STEPHEN ARNOLD (1813-1861), American statesman, b. in Vermont. He was appointed attorney general for the state of Illinois, and in 1843 elected a member of the House of Representatives. In 1847 he was member of the Senate, and by re-election was a member of this body till his death. He was especially prominent in connection with the question as to the extension of slavery into new states and territories, which he maintained was a matter to be settled by the people of the respective states or territories, and not by Congress. He was a presidential candidate in 1860, when Lincoln was elected.

**Doum Paim** (dom), a palm tree. It is remarkable, like the other species of the genus, for having a repeatedly-branched stem. Each branch terminates in a tuft of large fan-shaped leaves. The fruit is about the size of an apple; it has a fibrous mealy rind, which tastes like gingerbread, and is caten by the poorer inhabitants of Upper Egypt, where it grows.

**Douro** (dö' rō) (or Duero), one of the largest rivers of the Spanish Peninsula, which, flowing west, traverses about one half of Spain and the whole of Portugal, and, after a course of 500 mi., falls into the Atlantic three miles below Oporto. It is navigable for small vessels for about 70 mi.

**Do'ver**, a borough of England, county Kent, 67 mi. s.e. of London. It lies on the coast of the Strait of Dover, and is 21 mi. distant from Calais on the French coast. It is an important railway terminus, and as a port for mail and packet service with the Continent has a large passenger traffic. Shipbuilding, sail making, and fisheries are the chief industries. The harbor has been much improved in recent years. The entrance is protected by the Admiralty Pier, which is nearly half a mile in length. The celebrated castle of Dover stands on a chalk cliff 350 feet in height. Pop. 33,678.

**Dover**, Kent co., Del. Raifroad, Phil., Wil. & Balt. Industries: Canning and glass button factories. Dover is the capital of the state and is the center of a fruit growing region. Pop. est. 1897, 3,200. **Dover**, Strafford co., N. H., on the Cocheco River. Railroads: Boston & Maine; Dover & Portsmouth; and Dover & Winnipiscogee. Industries: Cotton and woolen manufacturies, print works, boot and shoe shops. Pop. est. 1897, 13,500.

**Dover**, STRAITS OF, the narrow channel between Dover and Calais which separates Great Britain from the French coast. At the narrowest part it is only 21 mi. wide. The depth of the channel at a medium in the highest spring tides is about 25 fathoms. On both the French and English sides the chalky cliffs show a correspondency of strata which leaves no room for doubt that they were once united.

**Dow** (or Douw, properly Dou), GERARD (1613-1675), an eminent painter of the Dutch school, was the son of a glazier, and b. at Leyden. He studied under Rembrandt, and united his master's manner in chiaroscuro with the most minute finish and delicacy.

**Dow,** NEAL, temperance reformer, b. in Portland, Me., March 20, 1804. In 1880 he was the candidate of the National Prohibition party for president of the U.S.

**Down**, a county of Ireland, in Ulster. Area 610,730 acres. Agriculture is comparatively advanced, oats, wheat, flax, and potatoes being the principal crops. The native breed of sheep is small, but valued for the delicacy of its mutton and the fine texture of its wool. The principal manufactures are linen and muslin. The fisheries on the coast, principally cod, haddock, and herring, are considerable. The county town is Downpatrick; others are Newtonards and Banbridge. Pop. 266,893.

Newtonards and Banbridge. Pop. 266,893. Doyle, A. CONAN, b. 1850. English writer. Graduated at Stonyhurst College and shortly after made a trip to the Arctic regions. Later he practised medicine at South Sea, in the meantime doing some literary work. Among his more important novels are, A Study in Scarl t, Firm of Girdlestone, Micah Clarke, etc. Dr. Doyle has lectured successfully in the U.S.

**Drachma** (drak'ma), the unit of weight and of money among the ancient Greeks. It was the principal Greek coin, was made of silver, and was worth about 194 cts. As a weight among the Greeks it was about 2 pwt. 7 grains troy.

troy. **Drag'on, a fabulous monster, the stories regarding which reach back almost as far as history. His form is described as generally resembling that of a winged and two-legged serpent, the body covered with scales, the head crested, and the mouth spouting fire. The immediate source of the mediæval conception is probably the Scriptures, modified by accounts brought home by the Crusaders of the crocodiles in Egypt.** 

**Dragon** (or dragon-lizard), a name for several species of lizards inhabiting Asia, Africa, and South America. The common flying lizard, the best type of the genus, is about 10 or 12 inches in length, the tail being extremely long in proportion to the body. The sides are furnished with peculiar extensions of the skin, forming a kind of wings, which help

# **Dragon Fly**

to support it in the air when it springs from branch to branch. Its food consists almost exclusively of insects.



Fringed Dragon.

**Dragon Fly**, a family of neuropterous insects. They have a large head, large eyes, and strong horny mandibles. They are beautiful in form and color, and are of very powerful flight. The great dragon fly is about 4 in. long, and the largest of the British species. They live on insects, and are remarkable for their voracity. The dragon fly deposits its eggs in the water, where the larve and pupe live on aquatic insects. The larval stage lasts for a year. The



Dragon Fly and Nymph.

family is of very wide distribution. The small blue Agrion is a common European form. In the U. S. the dragon fly is known as the devil's darning-needle.

**Dragon's Blood,** a resinous juice, usually obtained by incision from various tropical plants. It differs in composition, and is often much adulterated. It is opaque, of a reddishbrown color, brittle, and has a smooth, shining, conchoidal fracture. It is soluble in alcohol and oil, but scarcely so in water. It is used for coloring varnishes, staining marble, leather, and wood, for tooth tinctures, etc.

# Draining

**Dragon Tree**, a tree-like liliaccous plant, with a stem simple or divided at top, and in old age often much branched. It is a native of the Canaries, and yields the resin known as dragon's blood. It is often grown in stoves and greenhouses.



Dragon Tree.

Drainage Tubes are used in surgery to effect a discharge of matter from an abscess or other collection of matter when a free incision cannot be safely or conveniently made. They are usually made of india rubber or caoutchouc, and are introduced into the abscess or wound so that one end is in contact with the seat of discharge, while the other reaches to the surface of the skin.

**Draining**, in agriculture, a method of improving the soil by withdrawing the water from it by means of channels that are gener-ally covered over. The successful practise of draining in a great measure depends on a proper knowledge of the superficial strata, of their situation, relative degrees of porosity. etc. Some strata allow water to pass through them, while others more impervious force it to run or filtrate along their surfaces till it reaches more level ground below. In general where the grounds are in a great measure flat and the soils of materials which retain the excess of moisture, they require artificial means of drainage to render them capable of yielding good crops whether of grain or grass. The wetness of land which makes it inferior for agricultural purposes, may appear not only as surface water but as water which flows through the lower strata, and to draw off these there are the two distinct operations of surface-draining and under-draining. The rudest form of open drains are the deep furrows lying between high-backed ridges, and meant to carry off the surplus water after the soil is completely saturated, but in doing so they generally carry off also much of the best of the soil and of the manure which has been spread upon it. The ordinary ditch is a common form of water-course useful in certain cases, as in hill pastures. But covered drains at a depth of 4 ft. or so are the common forms in draining agricultural lands. They are gen-

erally either stone-drains or tile-drains. Stonedrains are either formed on the plan of open culverts of various forms, or of small stones in sufficient quantity to permit a free and speedy flltration of the water through them. The box-drain, for instance, is formed of flat stones neatly arranged in the bottom of the trench, the whole forming an open tube. In tiledrains, tiles or pipes of burnt clay are used for forming the conduits. They possess all the qualities which are required in the formation of drains, affording a free ingress to water, while they effectually exclude vermin, earth, and other injurious substances. Drainage tiles and pipes have been made in a great variety of forms, the earliest of which, since the introduction of thorough draining, was the horse-shoe tile, so called from its shape. These should always rest on soles, or flats of burned clay. Pipe tiles, which combine the sole and cover in one piece, have been made of various shapes, but the best form appears to be the cylinder. An important department of draining is the draining off of the waters which are the sources of springs. Sometimes the judicious application of a few simple drains, made to, communicate with the watery layers, will often dry swamps of great extent where large sums of money, expended in forming open drains in the swamp itself, would leave it but little improved. In the laying out of drains the first point to be determined is the place of outfall, which should always afford a free and clear outlet to the drains, and must necessarily be at the lowest point of the land to be drained. The next point to be determined is the position of the minor drains; in the laying out of which the surface of each field must be regarded as being made up of ohe or more planes, as the case may be, for each of which the drains should be laid out separately. Level lines are to be set out a little below the upper edge of each of these planes, and the drains must then be made to cross these lines at right angles. By this means the drains will run in the line of the greatest slope, no matter how distorted the surface of the field may be. All the minor drains should be made to discharge into mains or submains, and not directly into an open ditch or water-course. As a general rule there should be a main to receive the waters of the minor drains from every five acres. The advantages of drainage are obvious. In the first place it allows the soil to be brought into a more suitable condition for the growth of plants, aiding in producing the finely divided and porous state by which the roots and rootlets can spread themselves at will in order to obtain the needed supplies of food, air, and moisture. It also allows the sun's rays to produce their full effect on the soil and plants without being robbed of great part of it by the stagnant water.

**Drake**, SIR FRANCIS (1539-1596), an English navigator, b. at Tavistock, in Devonshire. He served as a sailor in a coasting vessel, and **after**ward joined Sir John Hawkins in his last expedition against the Spaniards (1567), losing nearly all he possessed in that unfortunate enterprise. On the most famous of his voyages Drake passed the Straits of Magellan, plundered all along the coasts of Chile and Peru, sacked several ports, and captured a galleon laden with silver, gold, jewels, etc., to the value of perhaps \$1.000.000. He then ran north, seeking a passage to the Atlantic, but was compelled to return to San Francisco on account of the cold. He then steered for the Moluccas, and holding straight across the Indian Ocean doubled the Cape of Good Hope, and arrived at Plymouth, Nov. 3, 1580, being thus the first of the English circumnavigators.

**Drake**, JOSEPH RODMAN (1795-1820), poet, b. in New York City. At first he was placed to serve in business, but soon abandoned merchandise for the study of medicine. In 1812 he became connected with Fitz-Greene Halleck. His most aspiring poem, *The Culprit Fay*, was written in his twenty-second year.

**Drake,** SAMUEL GARDNER (1798-1875), antiquary, b. in Pittsfield, N. H. He was educated at the public school, and at the age of twenty he became a public school teacher. In 1828 he opened the first antiquarian bookstore in the U. S. He was a founder of the New England Historical and Genealogical Society. He edited some New England works, and published many books of historical and antiquarian subjects.

**Drakenberg Mountains,** a range of South Africa forming the western frontier of Natal, and rising to the height of 9,000 ft., a continuation of the Quathlamba Range.

Drama (Gr., from drao, "I act"), a class of writings which almost entirely consist of dialogue, persons being represented as acting and speaking, and the pieces being usually intended to be acted on the stage by parties assuming the characters of the respective per-sons. Its two great branches are tragedy and comedy, the former, roughly speaking, melancholy in character, the latter cheerful. The origin of the drama must be sought for in the love of imitation, and dramatic performances of some kind are to be met with probably among all nations. Dramatic compositions are found in the Old Testament, for example in Job and the Song of Solomon; and ancient India and China both developed a dramatic literature of their own. The European drama had its origin in Greece. Both forms, tragic and comic, took their rise in the celebrations of the Greek festivals of Dionysus (Bacchus), at which hymns and chants were sung by choruses in honor of the god, and the chorus continued to be a prominent feature of the old Greek drama. Greek comedy commenced about 580-560 B. c. with Susarion, but it was long in attaining regular form. Of the old Greek comedy the chief representatives were Cratinus, Eupolis, Pherecrates, and Aristophanes—the last the greatest. The invention of tragedy is generally ascribed to Thespis about 530 B. C., who was followed by Phrynicus. But the true creator of tragedy was Æschylus. in whose works and those of Sophocles and Euripides it found its most perfect expression. Thespis had only one actor, who from time to

time relieved the chorus by declamation. Æschylus changed this representation into real action by making use of two actors in addition to the chorus. Æschylus also introduced masks; and by means of a long gown and the *cothurnus*, or buskin, the lofty stature of the heroes was imitated. A third actor was first introduced by Sophocles. The accommodations for the spectators were improved, and machinery and scenery introduced. The theaters, which had been formerly built of wood, were now large stone erections capable of containing the greater number of citizens. The regular drama among the Romans was borrowed from the Greeks. Plautus and Terence were imitators of the Greek comedy, Livius Andronicus (240 B. C.) of the Greek tragedy. Of the Roman tragedy, the dramas of Seneca are the only specimens extant. In most modern European countries the regular drama took its rise in the mysteries, miracle-plays, and moralities of the Middle Ages. In Italy, however, it began with a reproduction in Latin The earliest tragedy in of classical models. Italian is Trissino's Sofonisba (1502). Regular comedies in Italian were written by Ariosto, Arctino, Macchiavelli, and others; and to the same period (fifteenth and sixteenth centuries) belongs the Italian Pastoral Drama, which sprung from the ancient idylls, and aimed at a fanciful delineation of Arcadian and mythological scenes. Among the pastoral dramatists of this period are Poliziano, Tasso, and Guarini. The pastorals gave birth to the opera, early masters of which, so far as it may be included in the poetic drama, are Zeno and Metastasio. The Italian drama waned in the seventeenth century, but in the eighteenth genuine comedy and classic tragedy were restored, the former by Goldoni, the latter by Alfieri. Monti, Manzoni, and Niccolini are among the later writers of tragedy.

The other European nations cultivated the dramatic art much later than the Italians. The English and Spaniards devoted their attention to it almost at the same time; the former reaching their acme in Shakespeare, the latter in Lope de Vega and Calderon. The history of the English theater and drama is naturally divided into two parts, the first of which begins with the reign of Elizabeth and ends with the reign of Charles I. The rapid development of the drama during the reign of Elizabeth was entirely unhampered by foreign influence. Lyly, Peele, Greene, Marlowe, Shakespeare, Ben Jonson, Beaumont and Fletcher, Chapman, Webster, Middleton, Marston, Ford, and Massinger are among the chief names connected with the brilliant period of the English drama. During the Commonwealth the Puritans prohibited all kinds of plays, and the theaters were shut up for thirteen years. With Charles II the drama reappeared, and exhibited a licentiousness hardly equaled by that of any other Christian nation. Among the chief names belonging to this period are Dry-den, Otway, Lee, Shadwell, Wycherley, and Etherege. From the close of the seventeenth to that of the eighteenth century British

comedy was cultivated with much success by Cibber, Farquhar, Congreve, Sheridan, and others. During the nineteenth century many writers have been conspicuous by their dramas. Among the chief of these may be noted Byron. Coleridge, Landor, Shelley, Maturin, Talfourd, Milman, Sir Henry Taylor, the first Lord Lytton, Knowles, R. H. Horne, Arnold, Browning, Swinburne, and Tennyson.

The French drama was in a miserable state before Corneille (1600-84), who indeed is looked on as the founder of the drama in France. Racine, Molière, Voltaire, and in later times Hugo, are some of the other distinguished French dramatists. Since about 1820, a new dramatic school has been formed in France, which, departing from the ancient strictness of what is called the *classic*, approaches more and more to the German or British, or what is called the romantic school. The establishment of this school formed part of the general reaction against the excessive adherence to classic models in literature, the leader in the movement being Victor Hugo. C. Delavigne marks the transition from the classical to the beginnings of the romantic school, and among the modern dramatists may be mentioned A. de Vigny, George Sand, A. de Musset, Merimée, Ponsard, Augier, Scribe, Dumas the Younger, and Sardou.

The German drama is of later birth than any we have mentioned, and for a long time the Germans contented themselves with translations and adaptations from the French. Lessing was the first who, by word and deed, broke the French sway (1755), and he was succeeded by Schiller and Goethe, who rank as the greatest of the more modern dramatists. Prominent names in the German drama are Kotzebue, Körner, Schlegel, Tieck, Brentano, Grillparzer, Hebbel, Ludwig, Gutzkow, Freytag, Laube, Von Moser, etc. The Dutch drama begins with the classical tragedies of Koster in the beginning of the seventeenth century, and reached its highest in Vondel (1587-1659). Holberg, Heiberg, Ochlenschläger, Ibsen, and Björnson are the chief names connected with the Scandinavian drama.

The various classes of drama-tragedy, comedy, opera, pastoral, burlesque, farce, etc. -are noticed under their proper headings, but there are numerous varieties and modifications in the modern drama which defy classification.

**Draper**, JOHN WILLIAM (1811-1882). chemist and physiologist. He made many contributions to scientific literature, and devoted much attention to the chemical action of light, in connection with which he effected some discoveries. Among his chief works is his History of the Intellectual Development of Europe.

**Draper**, WILLIAM F., was b. in Lowell, Mass. 1842, where he still lives. His early education was intended to fit him for entrance to Harvard University, but before matriculation he decided to spend some time in the shops owned by his father, who was a manufacturer of cotton machinery, and before the time had passed the war broke out and he left for the front-

After four years' campaigning, during which he was twice wounded and was brevetted brigadier general, was discharged in 1864, and took up the same business as his father. He was a member of General Long's staff, was a delegate to the convention that nominated Hayes, as an elector at large he voted for Harrison, and was chairman of the committee on resolutions in the Republican state convention in 1887. He was a member of the Fifty-third Congress. He is now U. S. minister to Italy.

**Drave** (or Drau) (drä've, drou), a European river which rises in Tyrol, flows e.s.e. across the north of Illyria and the south of Styria, and between Hungary on the left and Croatia and Slavonia on the right, and after a course of nearly 400 mi. joins the Danube 14 mi. east of Essek. It is navigable for about 200 mi.

Dravid' ian, a term applied to the vernacular tongues of the great majority of the inhabitants of Southern India, and to the people themselves who must have inhabited India previous to the advent of the Aryans. The Dravidian languages are generally considered to belong to the Turanian class, and the family consists of the Tamil, Telugu, Canarese, Malayálam, Tulu, Tuda, Gond, Rajmahal, Oraon, etc. Only the first four mentioned have a literature, that of the Tamil being the oldest and most important.

Drawbridge, a bridge with a lifting floor, such as were formerly used for crossing the ditches of fortresses, or any movable bridge over a navigable channel where the height of the roadway is insufficient to allow vessels to pass underneath. Modern drawbridges across rivers, canals, the entrances of docks, etc., are generally made to open horizontally, and the movable portion is called a bascule, balance, or lifting bridge, a turning, swivel, or swing bridge, or a rolling bridge, in accordance with the mode in which it is made to open. Swingbridges are usually divided into two parts meeting in the middle, and each moved on pivots on the opposite sides of the channel, or they may move as a whole on a pivot in the middle of the channel. Rolling bridges are suspended from a structure high above the water, and are propelled backwards and forwards by means of rollers.

**Drawing** is the art of representing upon a flat surface the forms of objects, and their positions and relations to each other. The idea of nearness or distance is given by the aid of perspective, foreshortening, and gradation. The term drawing, in its strict sense, is only applicable to the representing of the forms of objects in outline, with the shading necessary to develop roundness or modeling. In art, however, the term has a wider significance. Highly finished paintings in water color are called drawing, as are also sketches or studies in oils. Drawing, in its restricted sense, may be divided into these kinds: 1, pen drawing; 2, chalk drawing, which may include lead-pencil drawing; 3, crayon drawing; 4, drawing shaded with the brush or hair pencil; 5, architectural or mechanical drawing. Pen drawings are often confined to pure outlines; an appearance of re-

lief or projection being given by thickening or doubling the lines on the shadow side. Finished pen drawings have all the shading produced by combinations of lines. Chalk drawing (including lead-pencil drawings) are most suited for beginners, as errors can be easily corrected. Black, red, and white chalks are used. When the chalk is powdered and rubbed in with a stump, large masses and broad effects can be produced with much rapidity. A combination of hatching and stumping is generally preferable to adhering exclusively to either mode. Crayon drawings are those in which the true colors of the objects represented are more or less completely wrought out with different colored crayons. Drawings shaded with the brush are outlined with the pencil or pen, the shading being laid on or washed in with the brush in tints of India ink, sepia, Architectural and mechanical drawor color. ings are those in which the proportions of a building, machine, etc., are accurately set out for the guidance of the constructor; objects are in general delineated by geometric or orthographic projection. The great schools of painting differ from one another as much in their drawing as in their painting. In Italy the Roman school, through Raphael's fine sense for the beautiful and expressive in form, and through his study of the antique, became the true teacher of beautiful drawing. The Florentine school tried to surpass the Roman precisely in this particular, but it lost by exaggeration what it had gained by learning and a close study of anatomy. In the Lombard school a tender style of drawing is seen through harmonious coloring, and in the Venetian school the drawing is often veiled in the rich-ness of the color. The Dutch school excels in a careful and minute style of naturalistic drawing, combined with great excellence in coloring. The French school in the time of Poussin was very accurate in its drawing; at a later period its style betrayed a great amount of mannerism. David introduced again a purer taste in drawing and a close study of the antique, and these are qualities which distinguish his school (the so-called classical school) from the romantic and eclectic schools of a later period.

**Dreams**, trains of ideas which present them-lves to the mind during sleep. The principal selves to the mind during sleep. feature of the state of dreaming is the absence of voluntary control over the current of thought, so that the principle of suggestion has unlimited sway. There is usually an utter want of coherency in the images that appear before the mental eye, but this want excites no surprise in the dreamer. Occasionally, however, intellectual efforts are made during sleep which would be difficult to surpass in the waking state. It is said that Condillac often brought to a conclusion in his dreams reasonings on which he had been employed during the day; and that Franklin believed that he had been often instructed in his dreams concerning the issue of events which at that time occupied his mind. Coleridge composed from 200 to 300 lines during a dream; the
beautiful fragment of Kubla Khan, which was all he got committed to paper when he awoke, remains a specimen of that dream poem. Dreams are subjective phenomena dependent on natural causes.

**Dredging**, a term applied to the operation of removing mud, silt, and other deposits from the bottom of harbors, canals, rivers, docks, The most simple dredging apparatus is etc. the spoon apparatus, which consists of a strong iron ring or hoop, properly formed for making an impression upon the soft matter at the bottom, so as to scoop it into a large, leather bag attached to the ring and perforated with a number of small holes. The means for working it is a long handle, a suspending rope, and a crane or sweep-pole planted in a boat. Much more effective is the steam dredging machine now in common use. It has a succession of strong iron buckets on an endless chain, which traverses on a frame whose lower end is vertically adjustable so as to regulate the depth at which it works. It is worked by steam, and the buckets tear up the matter at the bottom, raise it, and discharge it into punts or hoppers stationed close to the dredging vessel. Dredg-ing is also the operation of dragging the bottom of the sea in order to bring up oysters, or to procure shells, plants, and other objects for scientific observation. The oyster dredge is a light, iron frame with a scraper like a narrow hoe on one side, and a suspending apparatus on the other. To the frame is attached a bag made of some kind of netting to receive the oysters. The dredges used by naturalists are mostly modifications of the oyster dredge.

Dred Scott Decision.—This decision of the U. S. Supreme Court, delivered by Chief Justice Taney, March 6, 1856, awakened intense interest. The plaintiff, Dred Scott, was a slave in Missouri; his owner took him to Illinois, and also Minnesota, then a territory, both free soil, where he kept him for years, afterward moving back to Missouri, a slave state. The plea of Scott was that his residence in Illinois and Minnesota made him a free man. The decision was that he was a chattel, "without rights or privileges except such as those who held the power and the government might choose to grant him." The decision nationalized slavery by degrading the slave to the level of a horse or a plow, and overrode every sentiment of humanity respecting him.

**Drenthe** (dren'te), a province, Holland. Area 048 sq. mi. The soil is generally poor and the surface largely consists of heath and morass, but the province is famed for its horses and cattle. Drenthe is remarkable for the great number of so-called "giants graves" or barrows scattered over the country. Its capital is Assen. Pop. 125,792.

**Dres' den**, the capital of the kingdom of Saxony, on the river Elbe. It is first mentioned in history in 1206 and has been the residence of the sovereigns since 1485; was greatly extended and embellished by Augustus the Strong (1694-1736), and has rapidly increased during the nineteenth century. Among the chief edifices beside several of the churches are the Museum (joined on to an older range of buildings called the Zwinger), a beautifui building containing a famous picture gallery and other treasures; the Japanese Palace (Augusteum), containing the royal library of from 300,000 to 400,000 volumes, beside a rich collection of manuscripts; the Johanneum, containing the collection of porcelain and the historical museum, a valuable collection of arms, armor, domestic utensils, etc., belonging to the Middle Ages. The royal palace is unattractive externally, but has a fine interior. It contains (in what is called the Green Vault) a valuable collection of curiosities, jewels, trink-ets, and works of art. The theater is one of the finest structures of the kind in the world. The city is distinguished for its excellent ed-ucational, literary, and artistic institutions. among which are the Polytechnic School, much on the plan and scale of a university; the Conservatory and School of Music; the Academy of Fine Arts, etc. The manufactures are not unimportant, and are various in character; the china, however, for which the city is famed, is made chiefly at Meissen, four-teen miles distant. The chief glory of Dresden is the gallery of pictures, one of the finest in the world, which first became of importance under Augustus II, king of Poland and elector of Saxony, but owes its most valuable treasures to Augustus III, who purchased the greater portion of the gallery of the Duke of Modena for \$900,000. The pictures number about 25,-Besides this fine collection the museum 000. contains also engravings and drawings amount-ing to upwards of 350,000. There is here also a rich collection of casts exemplifying the progress of sculpture from the earliest times, and including copies of all the most important antiques. Dresden being thus rich in treasures of art, and favored by a beautiful, natural situation, is the summer resort of many foreigners. It suffered severely in the Thirty Years' War, and also in 1913 when it was the head-quarters of Napoleon's army. It was occupied by the Prussians in 1866 but was evacuated in the following spring. Pop. 276,085.

Dresden, BATTLE OF, a battle fought in 1813 between the French under Napoleon and the allies under Schwarzenberg. Napoleon had come to the relief of the city, which was occupied by the French. The allies assaulted and bombarded the city, and soon after a great pitched battle was fought (August 27), the allies being defeated.

Dresden China, a delicate, semi-transparent, highly finished china made at Meissen near Dresden. The manufacture resulted from an accidental discovery made by Bottger, a young chemist, in 1710, and the vases, statuettes, groups of figures, candelabra, clocks, etc., manufactured during the eighteenth century are highly prized. They are more remarkable for excellence of execution than for purity of design.

Drew, JOHN (1825-1862), American actor. b. at Dublin, Ireland. He came to the U.S. when a boy and appeared on the stage in New York City in 1845. Later he went to Philadelphia and became a favorite. In 1855 he became manager of the Arch street theater in company with William Wheatly. He toured England in 1855, California in 1858, and Australia in 1850.

Drew, JOHN, American actor, son of John Drew and Mrs. John (Louisa) Drew, b. in 1853 in Philadelphia. He first appeared in that city in 1872. Three years later he went to New York and took the part of Bob Ruggles in the Big Bonanza in the Fifth Avenue Theater. Later he appeared with Edwin Booth in Shakespearean plays, and was afterward connected with the Daly Theater where he remained until 1892. In that year he commenced starring on his own account.

**Drexel**, ANTHONY J. (1826-1893), banker. He was the head of the well-known firm of Drexel & Co., Philadelphia, having been identified with it since the age of 13. He was zealous in promoting science and art, especially music, and contributed largely to philanthropic and educational interests. The Drexel Institute of Art, Science, and Industry, Philadelphia, dedicated Dec. 18, 1891, was established by Mr. Drexel, the building costing over \$600,000, with an endowment fund of \$1,000,000. His name is associated with that of his friend, George W. Childs, in the inception of the Childs-Drexel Home for Union Printers, Colorado Springs, Colo., dedicated in 1892; they each contributing \$5,000.

**Drill**, a tool used for boring holes in wood, metal, stone, ivory, etc. It consists of a sharp chisel to which a circular motion is communicated by various contrivances. For drilling iron, steel, etc., a lathe driven by steam is generally used, the drill being fixed into a chuck and the work pressed against it as it revolves. For rock-boring the diamond rockdrill, and instrument with cutting edges made of boart of black diamond, is now generally adopted.

**Drill**, a species of baboon, of a smaller size and less fierce disposition than the mandrill, and like it a native of the coast of Guinea. The face and ears are bare and of a glossy black color, the palms of the hands and soles of the feet are also naked and of a deep copper color.

Drilling, the plan of sowing in parallel rows as distinguished from sowing broadcast. The crops which are now generally drilled are corn, wheat, beans, peas, carrots, clover, flax, etc. The first form of drill was of very simple construction, and was only adapted for sowing one row at a time, but now a great variety of improved implements are in use. Among the principal advantages of drilling over broadcast sowing we may mention that a considerable saving of seed is effected in the sowing of grain crops, but the great advantage is that in the case of green crops it enables the farmer more readily to clean the land both by the hand and by the plow. To keep the soil stirred and pulverized, which can only be properly done when the crops have been drilled, favors the retention and absorption of the moisture.

**Dripstone**, a projecting tablet or molding over the head of a doorway, window, archway, or niche to throw off the rain. It is also called a *weather molding*, and *label* when it is turned square. It is of various forms: sometimes a head is used as a termination or support, at others au ornament or simple molding is adopted.

**Drôme**, a southeast department of France, covered almost throughout by ramifications of the Alps, the average height of which, however, does not exceed 4,000 feet; area 2,508 sq. mi., of which about one fourth is waste, one third under wood, and a great part of the remainder under tillage and pasture. A considerable extent of the area is occupied by vineyards, and several of the wines produced have a high reputation, especially Hermitage. Olives, chestnuts, and silks are staple productions. Valence is the capital. Pop. 314,615.

Dromedary. See Camel.

**Drosom** 'eter (Greek, drosos, "dew ", and metron, "a measure"), an instrument for ascertaining the quantity of dew which falls. It consists of a balance, one end of which is furnished with a plate fitted to receive the dew, the other containing a weight protected from it.

Drowning means death by the air being prevented entering the lungs owing to the mouth and nostrils being immersed in a liquid, the liquid being commonly water. Death may, therefore, occur by drowning in a small quan-tity of water. When death has been caused by drowning, the skin presents the appearance called goose skin, the face and surface of the body generally are usually pale, a frothy liquid is found in the lungs and air passages, and about the lips and nostrils; water may be found in the stomach, and clenched fingers, holding substances grasped at, may serve to show that a struggle has taken place in the water, and that the body was alive at the time of immersion. Complete insensibility arises, it is probable, in from one to two minutes after submersion, recovery, however, being still possible, and death occurs in from two to five minutes. So long as the heart continues to beat, recovery is possible; after it has ceased it is impossible. Newly-born children and young puppies stand submersion longer than the more fully grown. For the restoration of the apparently drowned several methods are suggested. Those of Dr. Benjamin Howard, of New York, will be described.

Place the body on its face, with the roll of clothing under the stomach, the head being supported on the hand. Pull the body over the roll of clothing to expel water from the chest. Then turn the body on the back, the shoulders being supported. Kneel over the body. Place both hands on the lower part of the chest, so that the thumbs hook in under the lowest ribs and the fingers are spread out on the chest. Steadily press forward, raising the ribs, your own body being thus thrown leaning forward. This enlarges the cavity of the chest and causes air to enter. When the ribs have been raised to the utmost extent, with a slight effort push yourself back to the more erect position, allowing the ribs to recoil to their former position. This expels the air. Repeat the process fifteen times a minute.

Meanwhile, if other persons are present they should be occupied rubbing the body and limbs (always upwards) with hands or warm flannel, applying hot flannels, bottles, etc., to the limbs, feet, arm-pits, etc. As soon as the person is sufficiently restored to be able to swallow, give small quantities of hot brandy and water, hot wine and water, hot coffee, etc., and use every effort to restore and maintain warmth. Drowning was formerly a mode of capital punishment in Europe. In Paris a corps of Newfoundland dogs for saving drowning persons is maintained.

**Droz** (drõ), PIERREJACQUET (1721-1790), Swiss mechanician, born at Chaux-de-Fonds. Among his many contrivances were a compensation pendulum, a writing automaton, and an astronomical clock. HENRI LOUIS JACQUET (1752-1791), son of the preceding, followed the same line as his father, and constructed an automaton, representing a young female which played different tunes on the harpsichord; a pair of artificial hands for a young man who was mutilated, by means of which he was enabled to perform most of the necessary offices for himself.

**Druids**, the priests of the Celts of Gaul and Britain. According to Julius Cæsar they possessed the greatest authority among the Celtic nations. They had some knowledge of geometry, natural philosophy, etc., superintended the affairs of religion and morality, and performed the office of judges. They venerated the mistletoe when growing on the oak, a tree which they likewise esteemed sacred. They had a common superior, who was elected by a majority of votes from their own number, and who enjoyed his dignity for life. They took unusual care to fence themselves round with mysteries, and it is probable that they cherished doctrines unknown to the common people; but that they had a great secret philosophy which was handed down by oral tradition is very unlikely.

**Drum**, a musical instrument of percussion. of Eastern origin, either cylindrical or hemispherical in shape, with the end or ends covered with tightened parchment, which is stretched or slackened at pleasure by means of cords with sliding knots or screws. Drums are of three kinds: 1, the long or bass drum played with stuff-nob drum-sticks, and used only in large orchestras or military bands; 2, the side drum, having two heads, the upper one only being played upon by two sticks of wood; 3, the kettledrum, a hemisphere of brass or copper, the end of which is covered with parchment, always used in pairs, one drum being tuned to the keynote, and the other to the fifth of the key, the compass of the two together being an octave.

**Drum-fish**, Drum, *Pogonias chromis*, and other species of the same genus, fishes found on the Atlantic coasts of N. A., and so named from the deep drumming sound they make in the water. They usually weigh about 20 lbs.

**Drummond,** SIR HENRY (1851-1897), b. in Scotland, graduated at University of Edinburgh, and later studied in Germany. He was ordained minister of the Free Church, and in 1884 became professor of science in the Glasgow Free Church College. He published an account of his African trip in 1888. His best known works are, Natural Law in the Spiritual World, The Greatest Thing in the World-Low, and the Ascent of Man. Mr. Drummond has lectured to some extent in the U.S.

**Drummond,** •THOMAS (1797-1840), the inventor of the lime-ball light known by his name, was born at Edinburgh. 'He was educated at Edinburgh and at Woolwich, and entered the army as an engineer. In 1819 he became assistant to Colonel Colby in the trigonometrical survey of Great Britain and Ireland. He invented a heliostat, and first used the light which bears his name about 1825 during the survey of Ireland. He subsequently entered political life, and became in 1835 under secretary for Ireland, a country which he practically ruled with the utmost success for five years.

**Drummond,** THOMAS (1809–1890), b. in Lincoln co., Me., graduated at Bowdoin in 1830, and was admitted to the bar in Philadelphia. In 1835 he removed to Galena, II., and in 1860 became U. S. judge for the district of Illinois Five years later, when the state was divided. he became judge of the northern district, and in 1869 judge of the U. S. circuit court, which office he resigned in July, 1884.

**Drummond**, WILLIAM (1585-1649), of Hawthornden, a Scottish poet distinguished for the elegance and tenderness of his verses. He was educated at the University of Edinburgh. He was the first Scottish writer to abandon the native dialect for the language raised to supremacy by the Elizabethan writers. As a historian he is chiefly remarkable for an ornate style, and a strong attachment to the High Church principles of the Jacobites.

**Drummond Light**, a very intense light produced by turning two streams of gas, one of oxygen and the other of hydrogen, in a state of ignition upon a ball of lime. This light was proposed by Captain Drummond to be employed in light-houses.

**Drupe**, in botany, a stone fruit; a fruit in which the upper part of the pericarp becomes fleshy or softens like a berry while the inner hardens like a nut, forming a stone with a kernel, as the plum, cherry, apricot, and peach. The stone enclosing the kernel is called the *endocarp*, while the pulpy or succulent part is called the *mesocarp*. In some fruits, as these of the almond, the horse-chestnut, and cocoarnut, the mesocarp is not succulent, yet from their possessing the other qualities of the drupe. The date is a drup in which the stone or endocarp is replaced by a membrane.

**Druses**, a curious people of mixed Syrian and Arabian origin, inhabiting the mountains of Lebanon and Anti-Lebanon, in whose faith are combined the doctrines of the Pentateuch, part of the tenets of Christianity, the teachings of the Koran, and the Sufi allegories. They describe themselves as Unitarians and followers of Khalif Hakim Biamr-Allah, whom

they regard as an incarnation of deity, the last prophet, and the founder of the true religion.

Drusus, the name of several distinguished Romans, among whom were: MARCUS LIVIUS, orator and politician, became tribune of the people in 122 B.C. He opposed the policy of Caius Gracchus, and became popular by planting colonies. MARCUS LIVIUS, son of the above, was early a strong champion of the senate or aristocratic party, but showed grea skill in manipulating the mob. He rose to be tribune of the people, and was assassinated B.C. 91. NERO CLAUDIUS, brother of the Emperor Tiberius, b. B.C. 38. By a series of brilliant campaigns he extended the Roman empire to the German Ocean and the river Elbe, and was hence called Germanicus. By his wife Antonia, daughter of Mark Antony, he had a daughter. Livia, and two sons, Germanicus and Claudius, the latter of whom afterward became emperor. He died B.c. 9.

Dry'den, JOHN (1631-1700), English poet, was descended from an ancient family, his grandfather being Sir Erasmus Dryden of Canons Ashby, Northamptonshire. He was b. near Aldwinkle. Northamptonshire, and was admitted a king's scholar at Westminster under the celebrated Dr. Busby, whence he went to Trinity College, Cambridge, being here elected to a scholarship. After leaving the university he went to London, where he acted as secretary to his cousin, Sir Gilbert Pickering, a favorite of Cromwell: and on the death of the Protector he wrote his Heroic Stanzas on that event. In 1661 he produced his first play, The Duke of Guise. This was followed by The Rival Ladics, and The Indian Queen. In 1663 he married Lady Elizabeth Howard. In 1668 he published his celebrated Essay on Dramatic Poery. In 1668 the Maiden Queen, a tragi-comedy, was represented. This was followed in 1670 by the Tempest, an alteration from Shakespeare, in which he was assisted by Sir William Davenant. Dryden was shortly afterward appointed to the offices of royal historiographer and poet laureate. He now became professionally a writer for the stage. The first of his political and poetical satires, Absalom and Achitophel was produced in 1681, and was followed by The Medal, a satire against sedition, and Mac Flecknoe, a satire on the poet Shadwell. At the Revolution Dryden was deprived of the offices of poet laureate and historiographer. During the remaining ten years of his life he produced some of his best work, including his admirable translations from the classics.

Drying-machine, a machine used in bleaching, dyeing, and laundry establishments, consisting of two concentric drums or cylinders, one within the other, open at the top, and having the inner cylinder perforated at its side with numerous small holes. The goods to be dried are placed within the inner cylinder, and the machine is then made to rotate with great velocity, when, by the action of centrifugal force, the water escapes through the holes in the side. The action of the drying machine is the same in principle as that witnessed when a person trundles a mop to dry it.

**Drying-oil**, the name given to linseed and other oils which have been heated with oxide of lead; they are the basis of many paints and varnishes. When exposed to the air they absorb oxygen, and are converted into a transparent, tough, dry mass or varnish.

**Dry-point**, a sharp-pointed instrument used by engravers to incise fine lines in copper without the plate being covered with etchingground or the lines bit in by acid. This tool is much employed in working the more delicate portions of plate produced as etchings.

Du'alism, the philosophical exposition of the nature of things by the hypothesis of two dissimilar primitive principles not derived from each other. Dualism in religion is chiefly confined to the adoption of a belief in two fundamental beings, a good and an evil one, as is done in some Oriental religions, especially that of Zoroaster. In metaphysics, dualism is the doctrine of those who maintain the existence of spirit and matter as distinct substances, in opposition to idealism, which maintains we have no knowledge or assurance of the existence of anything but our own ideas or sensations. Dualism may correspond with realism in maintaining that our ideas of things are true transcripts of the originals, or rather of the qualities inherent in them, the spirit acting as a mirror and reflecting their true images; or it may hold that, although produced by outward objects, we have no assurance that in reality these at all correspond to our ideas of them, or even that they produce the same idea in two different minds.

Dub'lin, the metropolis of Ireland, is situated in Dublin co., on the east coast of the island, at the mouth of the Liffey, the banks of which for more than two miles from the sea are lined with quays. The principal street at right angles to the river is Sackville street, a splendid street 650 yards long and 40 yards wide, forming a thoroughfare which is continued across the river by O'Connell Bridge, a magnificent structure the same width as Sackville street. The principal public secular buildings are the Castle, the official residence of the viceroy; the Bank of Ireland, formerly the Irish Parliament house; Trinity College; the courts of justice; the customhouse; the King's Inns; the post office; rotunda; corn exchange; commercial buildings; the mansion house; city hall or corporation buildings; etc. The most important literary and scientific institutions are Trinity College (Dublin University); the Royal University; the Royal College of Science; the Roman Catholic University; the College of Surgeons; the Royal Dublin Society: the Royal Hibernian Academy of Painting, Sculpture, and Architecture: the Royal Irish Academy for Promoting the Study of Science, Literature, and Antiquities; the Archæological Society; the Royal Zoological Society, etc. A little northwest of the city, up the Liffey, is the Phœnix Park, with an area of 1,750 acres. In it are the Viceregal Lodge, the residence of the Lord Lieutenant;

the chief secretary's and under secretary's official residences; the Royal Hibernian Military School, and the depot of the Royal Irish Constabulary; as also the gardens of the Royal Zoological Society. Pop. 254,709.

**Dublin**, UNIVERSITY OF, an institution founded in 1591, when a charter, or letters-patent, was granted by Queen Elizabeth for the incorporation of the "College of the Holy and Undivided Trinity," the University and Trinity College being practically the same. The corporation now consists of a provost, seven senior fellows, twenty-six junior fellows, and seventy foundation scholars. The senate of the university consists of "the chancellor of the university, or. in his absence, of the vicechancellor, and such doctors or masters of the university as shall have and keep their names on the books of Trinity College." The senate possesses the right of electing the chancellor of the university: it is also the body which grants degrees. The scholarships are tenable for five years, or till the degree of M. A. is attained. The course of general instruction extends over four years. The number of students is usually about 1,300.

**Du Bois,** Clearfield co., Pa., on Sandy Lick Creek, 127 mi. n.e. of Pittsburg. Railroads: R. & C. branch of Pa.: Allegheny Valley; B., R. & P.; and Clearfield & Mahoning. Industries: lumber, roller mill, iron foundry, milling, hosiery nill, machine shops, car works, casket factory, brewery, tannery, and window glass factory. Surrounding country mineral; coal and gas in large quantities. Du Bois was first settled 30 years ago by John Du Bois and John Runbarger, and is still a borough. Pop. est. 1897, 10,000.

**Dubuque** (du- $b\bar{u}k'$ ), a city of Iowa, on the right bank of the Mississippi. It occupies an important commercial position as a railway center and entrepot for the agricultural and mineral products of the northern half of Iowa, and the timber of Wisconsin, and from valuable lead mines in its vicinity. Pop. 30,311.

**Duc'at**, a coin formerly common in several European states, especially in Italy, Austria, and Russia. They were either of silver or gold; average value of the former, 75 cents to \$1.00, and of the latter about \$2.32. It was named from being first coined in one of the the Italian duchies—Lat. *ducatus*, "a duchy."

Du Chaillu (du-shā-yü), PAUL BELLONI, trav-eler, b. in Paris, 1835. In 1852 he came to the U. S. and became a naturalized citizen. In 1855 he began his first journey through Western Africa, and spent till 1859 alone among the different tribes, traveling on foot upward of 8,000 mi. He collected several gorillas, never before hunted, and rarely, if ever, before seen by any European. The result of this journey was published in 1861. A second expedition was made in 1863, an account of which, under the title A Journey to Ashango Land, appeared in 1867. The Land of the Midnight Sun, an account of a tour in Northern Europe (1881), had a considerable success. His latest work is The Viking Age, a treatise on the ancestors of the English-speaking peoples.

#### Dudevant

Duck, the name common to all the webfooted birds constituting the Linnæan genus Anas, now raised into a sub-family Anatine. and by some naturalists divided into two subfamilies, Anatinæ and Fuligulinæ, or land ducks and sea ducks. The ducks are very numerous as species, and are met with all over the world. They are often migratory, going northward in summer to their breeding places Their food is partly vegetable, partly animal The common mallard or wild duck is the original of the domestic duck. In its wild statthe male is characterized by the deep green of the plumage of the head and neck, by a while collar separating the green from the dark chestnut of the lower part of the neck, and by having the four middle feathers of the tail recurved. The wild duck is taken in largequantities by decoys and other means. Some tame ducks have nearly the same plumage as the wild ones; others vary greatly, being generally duller or pure white, but all the males have the four recurved tail feathers. There are several favorite varieties of the domestic duck, those of Normandy and Picardy, in France, and the Aylesbury ducks in England being remarkable for their great size and delicacy of flesh. The musk duck, erroneously called the Muscory duck. a native of South America, is the largest of the duck kind, and approaches nearly to the size of a goose. The canvas-back duck is peculiar to America, and is celebrated for the excellence of its flesh. Other species of ducks are the shoveler, remarkable for the strange form of its bill; the gadwall, which is more rare in America than in Europe; the pintail or sprigtail, remarkable for the form of its tail, abundant in both hemispheres; the black or dusky duck, peculiar to America, and very abundant: the summer or wood duck, remarkable for the form of its great beauty, and for its migrations being directly opposed to those of other species: the teal, the eider duck, so well known for its valuable down; the scoter; the pochard or redhead, the scaup duck or blue-bill; the longtailed duck; the harlequin duck, all found on both continents.

**Duckweed**, the popular name of several species of *Lemna*, nat. order Lemnaceæ, plants growing in ditches and shallow water, floating on the surface, and serving for food for ducks and geese. Five species are known in Britain, and others are common in America. They consist of small fronds bearing naked unisexual flowers.

**Ductil'ity**, the property of solid bodies, particularly metals, which renders them capable of being extended by drawing, while their thickness or diameter is diminished, without any actual fraction or separation of their parts. On this property the wire-drawing of metals depends. The following is nearly the order of ductility of the metals which possess the property in the highest degree, that of the first mentioned being the greatest: gold, silver. platinum, iron, copper, zlnc, tin, lead, nickel, palladium, cadmium.

Dudevant (dud-vän), Armantine-Lucile-Aurore Dupin, Madame (1804-1876), better

known by the nom de plume of George Sand, one of the greatest of French novelists. In conjunction with Jules Sandeau, a young lawyer, she wrote *Rose et Blanche*, which was published in 1831, with the pseudonym Jules Sand. Her son, Maurice Dudevant, b. in Paris, 1825, has written several novels, etc., and has attained a certain reputation as an artist.

Dud'ley, a town of England in an isolated part of Worcestershire inclosed by Staffordshire, 8 mi. n. w. of Birmingham. It is situated in the midst of the "black country," and has extensive coal mines, iron mines, iron works, and limestone quarries. It produces nails, chain-cables, anchors, vices, boilers, fire irons, and has also glass works, brickworks, brass foundries, etc. There are the remains of a castle, said to have been founded in the eighth century by a Saxon prince called Dud, who has given the town its name. Pop. 90,223.

Dudley, JOSEPH (1647-1720). Colonial governor of Massachusetts, b. in Roxbury, Mass. He was the son of Thomas, a former colonial governor. He was graduated at Harvard in 1665, and studied theology; in 1673 he became a magistrate in Roxbury. In 1682 he visited England on behalf of the colonists, but was unable to accomplish their purposes. In 1685 he was appointed president of New England, and in 1687 he was made chief justice of the Supreme Court. From 1690 until 1693 he was chief justice of New York, and in 1603 again went to England to become deputy governor of the Isle of Wight. In 1702 he returned to the U. S. and became governor of Massachusetts. This office he occupied until 1715.

**Dudley Limestone**, a highly fossiliferous limestone belonging to the Silurian system, occurring near Dudley, and equivalent to the Wenlock limestone. It abounds in beautiful masses of coral, shells, and trilobites.

**Duel** (from Latin duellum, from duo, two), a premeditated and prearranged combat between two persons with deadly weapons, for the purpose of deciding some private difference or quarrel. The combat generally takes place in the presence of witnesses called seconds, who make arrangements as to the mode of fighting, place the weapons in the hands of the combatants, and see that the laws they have laid down are carried out. The origin of the practise of dueling is referred to the trial by "wager of battle" which obtained in early ages. This form of duel arose among the Germanic people, and a judicial combat of the kind was authorized by Gundebald, king of the Burgundians, as early as 501 A.D. When the judicial combat declined, the modern duel arose, being probably to some extent an independent outcome of the spirit and institutions of chivalry. France was the country in which it arose, the sixteenth century being the time at which it first became common. Upon every insult or injury which seemed to touch his honor, a gentleman thought himself entitled to draw his sword, and to call on his adversary to give him satisfaction, and it is calculated that 6,000 persons fell in duels during ten

years of the reign of Henry IV. His minister, Sully, remonstrated against the practise; but the king connived at it, supposing that it tended to maintain a military spirit among his people. In 1602, however, he issued a decree against it, and declared it to be punishable with death. Many subsequent prohibi-tions were issued, but they were all powerless to stop the practise. During the minority of Louis XIV more than 4,000 nobles are said to have lost their lives in duels. The practise of dueling was introduced into England from France in the reign of James I; but it was never so common as in the latter country. In France dueling still prevails to a certain extent; but the combats are usually very bloodless and ridiculous affairs. In the German army it is common, and is recognized by law. The ducis of German students, so often spoken of, seldom cause serious bloodshed. In the U.S. duels are now uncommon. In some of the states the killing of a man in a duel is punish-able by death or by forfeiture of political rights, and in a large number the sending of a challenge is a felony. In the army and navy it is forbidden.

Duff'erin, FREDERICK TEMPLE HAMILTON-BLACKWOOD, MARQUIS OF, British statesman and author, son of the fourth Baron Dufferin and a granddaughter of R. B. Sheridan, b. at Florence 1826. He began his public services in 1855, when he was attached to Earl Russell's mission to Vienna. Subsequently he was sent as commissioner to Syria in connection with the massacre of the Christians (1860); was under Indian secretary (1864-66); under secretary for war (1866); chancellor of the duchy of Lancaster (1868-72); governor general of Canada (1872-78); ambassador at St. Petersburg (1879-81); at Constantinople (1882); sent to Cairo to settle the affairs of the country after Arabi Pasha's rebellion (1882-83); viceroy of India (1884-88); British ambassador to Italy (1889). In 1891 he was appointed ambassador to Paris.

**Du'gong**, an herbivorous mammal, the *Halicorē dugong*, belonging to the order Sirenia, which includes the manatees. It is a native



of the Indian seas; possesses a tapering body ending in a crescent-shaped fin, and is said sometimes to attain a length of 20 ft., though generally it is about 7 or 8 ft. in length. The skin is thick and smooth, with a few scattered bristles; the color bluish above and white be-

## Du Guesclin

neath. In its osteology it exhibits some points of correspondence with the Pachydermata. Its food consists of marine plants; it yields little or no oil, but is hunted by the Malays for its flesh, which resembles young beef, and is tender and palatable.

Du Guesclin (dü-gä-klan), BERTRAND (1314– 1380), constable of France. Mainly to him must be attributed the expulsion of the English from Normandy, Guienne, and Poitou.

**Duisburg** (dö'is-burk), a flourishing town in Rhenish Prussia, 13 mi. n. of Düsseldorf. It is an ancient place, believed to be of Roman origin, early rose to be a free town, and became a member of the Hanseatic League. It possesses a beautiful church of the fifteenth century, and has iron manufactories, engineering works, chemical works, cotton and woolen mills, etc.; and a large trade greatly facilitated by a canal communicating with the Rhine, which is about 2 mi. distant. Pop. 47,519.

**Dukama'ra** (L. dukis, sweet, and amarus, bitter; lit. bittersweet), a common British hedge plant, otherwise called bittersweet or woody nightshade. It is found in this country from New England to Arkansas; its root being chewed gives a sensation of bitterness, then of sweetness.

Dul'cimer, one of the most ancient musical instruments, used in almost all parts of the world. The modern instrument consists of a shallow trapezium-shaped box without a top across which runs aseries of wires, tuned by pegs at the sides. and played on by being struck by two cork-headed hammers. It is in much less common use in Europe now than it was a century or two ago, and is interesting chiefly as being the prototype of the piano. It is still, however, occasionally to be met with on the Continent at rustic rejoicings, and in England in the hands of street musicians. The Hebrew psaltery is supposed to have been a variety of the dulcimer.

**Duluth** (du-luth'), a town of the U. S., capital of St. Louis co., Minn., at the s.w. extremity of Lake Superior. Five railroads, including Northern Pacific and St. Paul & Duluth, center here; large docks and other works have been constructed affording a convenient outlet for the surrounding wheat region. Pop. 33,115.

**Dumas** (du-mä), ALEXANDRE (1803-1870), French novelist and dramatist. He was the son of a republican general, and grandson of Marquis de la Pailleterie and a negress, Tiennette Dumas. In 1823 he went to Paris, and obtained an assistant secretaryship from the Duke of Orleans, afterward Louis Philippe. He soon began to write for the stage, and in 1829 scored his first success with his drama *Heary III*. It was produced when the battle between the Romanticists and the Classicists was at its height, and hailed as a triumph by the former school. The same year appeared his Christine, and in quick succession Antony, Richard d'Arlington, Térésa, Le Tour de Nesle, Catharine Howard, Mile. de Belle-Isle, etc. Dumas had now become a noted Parisian character. The critics fought over the merits

#### Dumbarton

of his pieces, and the scandal-mongers over his prodigality and galanteries. Turning his attention to romance, he produced a series of historical romances, among which may be mentioned, Les Deux Dianes; La Reine Margat: Les Trois Mousquetaires with its continuations Vingt Ans Après and Viscomte de Bragelonne. The Monte-Cristo and several others are also well known to English readers through translations. Several historical works were also written by him: Louis XIV et son Siecle; Le Regent et Louis XV; Le Drame de '03; Florence et les Médicie, etc. The works which bear his name amount to some 1,200 volumes, including about 60 dramas; but the only claim he could lay to a great number of the productions is-sued under his name, was that he either sketched the plot or revised them before go-ing to press. He earned vast sums of money, but his recklessness and extravagance latterly reduced him to the adoption of a shifty, scheming mode of living. His *Mémoirce*, be-gun in 1852, present interesting sketches of literary life during the Restoration, but display intense egotism. In 1860 he accompanied Garibaldi in the exposition which freed Naples from the Bourbons. He died at the residence of his son, at Puys, near Dieppe, in 1870.

**Dumas**, ALEXANDRE (1824-1895), son of the above, novelist and dramatist. His works treat mostly of the relations between vice and morals. His first novels, La Dame aux Cametias and Diane de Lys, were very successful, as were also the plays which were founded on them. His dramas, which are much superior to his novels, deal satirically with the characters, follies, and manners of French society.

Du Maurier (du-mö'ri-ä). GEORGE LOUIS PALMELLA BUSSON (1834-1896), artist and caricaturist, was b. in Paris, 1834, but was a naturalized British subject. He went to England in 1851, and studied chemistry, but soon adopted art as a profession. After studying in Belgium and France he began to draw on wood for Once a Week, The Cornhill Magazine, etc. He subsequently joined the Punch staff and became famous through his weekly drawings to that publication. As a novelist he is immortal for his well-known work, Tridby.

Dumbar'ton, a seaport, Scotland, chief town of Dumbarton co. Shipbuilding is carried on to a great extent, and there are foundcalled Alcluyd, and it was the chief town of Cumbria, or Strathclyde. Pop. 13,118. A little to the south is the famous rock and castle of Dumbarton, rising above the Clyde. The rock, which is of basalt, is 240 ft. in height, and about one mi. in circumference at the base. It is one of the fortresses stipulated to be kept in repair by the Act of Union, and the barracks contain accommodation for 150 men. There has been a stronghold here from the earliest times, and the fortress of Dumbarton occupied an important place in Scottish history. The county of Dumbarton is partly maritime, partly inland. More than one half of Loch Lomond and fully two thirds of the islands in it belong to Dumbartonshire. The



Garloch, an arm of the Firth of Clyde, forms a part of the county into a peninsula. The chief minerals are coal, limestone, ironstone, and slate, all of which are wrought more or less. On the banks of the Leven and elsewhere are extensive cotton printing and bleaching establishments; and there are extensive ship-building yards along the Clyde. Vestiges of the Roman wall of Antoninus still exist. Pop. 94,511.

Dumb-bells, weights usually in the form of two iron balls connected by a straight piece for holding, used in gymnastic exercises for strengthening the muscles of the arms and chest.

Dumfries (dum-frēs'), a river port, railway center, and parliamentary burgh, Scotland, capital of the county of same name, and the chief place in the south of Scotland. There are iron foundries, hosiery and tweed factories, tanneries, coach building works, etc. The church of the Minorites which once stood here was the scene of the murder of the Red Comyn by Bruce in 1306. Burns spent his closing years here, and the street in which he lived now bears his name. His remains rest under a handsome mausoleum, and a statue of him was erected in 1882. Pop. 16,673. The county abuts on the Solway Firth. The surface is irregular, but for the most part mountainous, especially in the n. and n.w. districts, where the hills attain a considerable elevation, some of them exceeding 2,000 ft. Good cattle are reared, and are much in request for the English market. The minerals most abundant are coal, lead, iron, antimony, and gypsum. Coal and lead are worked to a small extent. Limestone and freestone abound in various parts. There are no manufactures worth mentioning. Its principal towns are Dumfries, Annan, Sanguhar, Lockerbie, Moffat, and Lochmaben. Pop. 74,308.

Dümouriez (di-mö-ria), CHARLES FRANÇOIS DUPERRIER (1739-1823), a French general of great military talent. He served as an officer in the Seven Years' War. In 1768 he went to Corsica as quartermaster general of the small army which was sent for the conquest of that island, and was afterward made colonel. In 1778 he was appointed governor of Cherbourg. At the Revolution he joined the Jacobins, and subsequently the Girondists, and in 1792 he was minister of foreign affairs. War breaking out between France and Austria, he resigned in order to take command of the army; invaded Flanders, and defeated the Austrians at Jemappes and conquered Belgium. Instead of prosecuting the war vigorously he now entered upon measures for the overthrow of the revolutionary government, issued a proclamation, in which he promised the restoration of the constitutional monarchy in the person of the heir to the crown, but was attacked by the Versailles volunteers, and compelled to flee (April 4, 1793). The convention set a price of 300,000 livres upon his head. At first he retired to Brussels, and after various wanderings found a final refuge in England. His Memoirs, written by himself, appeared in 1794; an enlarged edition in 1822. He was also the author

of a large number of political pamphlets. Düna (dů'nà) (or Western Dvina), a river of Russia, course 650 mi. It is navigable for a considerable distance, but is frozen for about four months each year.

Dünaburg (dü'na-burg) (or Dvinaburg), a fortified town, Russia, government of Vitebsk, on the right bank of the Düna, or Dvina, 112 mi. s.e. from Riga. It carries on various industries, a considerable trade, and has three yearly fairs. Pop. 69,033.

Dunbar', a town of Scotland, in Haddingtonshire, at the mouth of the Firth of Forth. It is a place of great antiquity, having originated in a castle, once of great strength and importance, which underwent several memorable sieges, on one occasion being successfully defended against the English for nineteen weeks by Black Agnes, counters of Dunbar. In 1650 Cromwell totally defeated the Scottish army under David Leslie near the town. The harbor is not very commodious, but the town is an important fishing station. Pop. 3,661.

Dunbar', WILLIAM (1460-1520), the most eminent of all old Scottish poets. On the most riage of James IV to Margaret of England Dunbar celebrated the event in a poem of great beauty, entitled. The Thrissil and the Pair this work with the three states and the Rois. His works, which consist of elaborate allegories, satirical and grimly humorous pieces, and poems full of brilliant description and luxuriant imagination, were first collected by David Laing.

Dun'ciad, THE, a celebrated satirical poem by Pope, in which he gibbets his critics and foes. The first three books were published in 1728; the fourth book, or New Dunciad, appeared in 1742, with illustrations by Scriblerus and notes *variorum*. Cibber was latterly substi-tuted for Theobald as the hero; and among others who figured in the satire were Ambrose Philips. Blackmore, Bentley, Defoe, Dennis Shadwell, Settle, etc.

Dundas' of Arniston, the name of a family several members of which held a conspicuous place in the legal and political history of Scotland.

Dundee', a city, of Scotland, in the county of Forfar, on the north shore of the Firth of Tay, about 8 mi. from the open sea, 37 mi. n. n.e. of Edinburgh; in population the third town in Scotland. The chief educational institution is the University College for males and females, whose first session opened in 1883. The town has long been celebrated for its textile manufactures, particularly those of the coarser descriptions of linen, and it is now the chief seat of the linen trade in Scotland and of the jute trade in Great Britain, there being a great number of mills and factories engaged in the spinning and weaving of flax, jute, and hemp. Shipbuild-ing is extensively carried on, and there are large engineering establishments, etc. Another branch of business is the northern seal and whale fishery. In 1645 Dundee was besieged, taken, and sacked by the Duke of Montrose; and six years afterward it was stormed by

Monk, when a great number of its inhabitants were put to death. Pop. 155.640.

Dundon'ald, THOMAS COCHRANE, EARL OF (1775-1860), British admiral, was b. in Lanarkshire. At the age of eighteen he embarked with his uncle, then Captain, and afterward Sir Alexander Cochrane, in the Hind, of twenty-eight guns, and soon distinguished himself by his daring and gallantry. In 1800 he was appointed to the Speedy sloop-of-war of fourteen guns, and in the course of thirteen months captured over fifty vessels, but was at last captured himself. In 1805 while in command of the Pallas frigate, he took some rich prizes, and for the next four years in the Impérieuse performed remarkable exploits in cutting out vessels, storming batteries, destroying signals, etc. On his return to England he entered Parliament. In 1818 he took service in the Chilean navy, his exploits greatly aiding the national independence of that country, as well as soon after of Brazil. In 1831 by the death of his father, he had succeeded to the name and title of Earl of Dundonald; in 1841 he became vice-admiral of the blue; in 1848 he was appointed commander in chief on the North America and West India station; and in 1851 and 1854 respectively he became vice-admiral of the white, and rear admiral of the United Kingdom.

**Dunedin** (dun-ē'din), capital of the provin-cial district of Otago, New Zealand, and the most important commercial town in the colony, stands at the upper extremity of an arm of the sea, about nine miles from its port, Port Chalmers, with which it is connected by railway. Though founded in 1848 its more rapid progress dates only from 1861 when extensive gold-fields discovered in Otaga attracted a large influx of population. It is well paved, lighted with gas, and has a good supply of water. There are many handsome buildings, both public and private; the municipal buildings, the post office, hospital, lunatic asylum, government offices, the university, high schools (boys' and girls'), the new museum, several banks (especially the Bank of New Zealand), the Athenæum, and mechanics' insti-tute, the Free Masons' hall, two theaters, etc. Wool is the staple export. Several woolen and other manufactories are now in existence. There is a regular line of steamers between this port and Melbourne, and communication is frequent with all parts of New Zealand. Through the opening of the new Victoria Channel from Port Chalmers vessels drawing sixteen feet can now ascend to Dunedin at low water. Pop. 45,865.

**Dunferm' line**, a burgh of Scotland, county of Fife, 3 mi. n. of the Firth of Fourth, and 13 mi. n.w. of Edinburgh. Dunfermline was early a favorite residence of the kings of Scotland, and in it were born David II, James I, Charles I, and his sister Elizabeth. The Benedictine abbey founded by Malcolm Canmore (1070) is now represented chiefly by the Abbey Church, underneath the pulpit of which are the remains of King Robert Bruce. Dunfermline early took the lead in the manufacture of tablelinen, and is still unrivaled by any other town in the kingdom. There are collieries in the neighborhood. Pop. 22,365.

**Dun-fish**, a name for cod cured by being split open, partially salted, piled up in a dark place under salt grass or hay, and then closely packed; named from their dun color.

**Dunkers**(or Tunkers), a religious sect founded in Schwartzenau, Germany, in 1708, and which takes its name from the Ger. *tunken*, to dip, from their mode of baptizing converts.

Dunkirk', a seaport town. France, department Nord at the entrance of the Strait of Dover, surrounded by walls, and otherwise defended by forts and outworks. It has several fine churches, a college, a public library, and a gallery of paintings; manufactures of earthenware. leather, soap, starch, ropes; sugar refineries, breweries, distilleries, etc. Pop. 38,025.

Dunkirk, Chautauqua co., N. Y.. on Lake Erie, 40 mi. w. of Buffalo. Railroads: L. S. & M. S.; N. Y. L. E. & W.; N. Y. C. & St. L.: W. N. Y. & P; D. A. G. & P. Industries: locomotive works, flour mill, four iron foundries. several planing and lumber mills. Surrounding country agricultural, center of the Chautauqua grape belt. The town was first settled in 1809 and became a city in 1880. Pop. est. 1897, 13,000.

**Dunmore,** JOHN MURRAY, EARL (1732-1800), royal governor of Virginia. He was made a peer in 1756, became governor of New York in 1770, and of Virginia in 1771. In 1772 he went to Williamsburg, Va. In 1776 he raided the settlers on York and James rivers, destroying their property and kidnapping their slaves. On December 9 his band was defeated in a skirmish at Great Bridge, in revenge for which he set fire to Norfolk. In the following year his party occupied Gwynn Island, in Chesapeake River, where he was wounded, and from which they were dislodged. In 1786 he was appointed governor of the Bermuda Islands.

Dunmore, Lackawanna co., Pa. Railroads: Erie & Wyoming Valley, and D. L. W. Industries: iron and steel mills, feed mill, and store works. It derives its prosperity chiefly from the anthracite coal mines which are worked in the vicinity. Pop. est. 1897, 12,-000.

Duns, JOHN (1205-1308), commonly called Duns Scotus, an eminent scholastic divine. He was the apostle of realism, which was opposed to the systems of nominalism and conceptualism promulgated by the other sections into which the schoolmen were divided. He d., it is said, at Cologne in 1308, leaving behind him numerous works.

Dun'stan, ST. (925-988), an Anglo-Saxon divine and statesman. He entered the Benedictine order, became an anchorite at Glastonbury, and in 945 was made abbot by King Edmund. After the death of Edmund, Edred, the next king, made him his prime minister and principal director in civil and ecclesiastical affairs. In the reign of Edwy he was banished, but was recalled by Edgar, and made archbishop of Canterbury. He was

again deprived of power on the accession of Ethelred in 978, and devoted the last years of his life to his diocese and the literary and artistic pursuits of his earlier days.

Dupont, SAMUEL FRANCIS (1803–1805), naval officer, b. in Bergen Point, N. J. He was appointed a midshipman in the U. S. navy, 1815, and becamelieutenant in 1826, and commander in 1842. In 1845 he commanded the frigate *Congress.* He served in the war with Mexico, and was made captain in 1855. In 1857 he was sent on special duty to China. In 1861 he was in command of the navy yard in Philadelphia, and equipped and organized the naval force for service in the Civil War. In 1861, he was appointed flag officer, and given the command of the South Atlantic squadron, and carried Gen. W. T. Sherman's force, numbering 10,000 men, to capture Port Royal, S. C. On November 7 he attacked Fort Walker. In August, 1862, he was made a rear admiral. In 1863, Admiral Dupont was relieved by Admiral Dahlgren, and he returned to Wilmington, Del. He was the author of a treatise on the use of floating batteries for coast defenses.

**Düppel** (dup'1), a fortified village in the province of Schleswig, Prussia, on the coast of the Little Belt. The place is of considerable strategical importance and has been the scene of some severe struggles between the Danes, to whom it formerly belonged, and the Germans. It was captured by the Prussians in 1864, after a siege and bombardment which lasted nearly two months.

Durand, ASHER BROWN (1796-1886), painter, b. in Jefferson, N. J. His first great work was to engrave Trumbull's Declaration of Independence. In 1825 he produced Musidora, and in 1828, General Juckson. He made many plates for the annuals, and engraved some heads for the National Portrait Gallery. In 1836 portraiture and landscape painting became his chosen occupations. Of portraits, he completed those of Jackson, J. Q. Adams. Bryant, Kent, and others: of figure paintings he executed Hartey Birch and Washington, The Wrath of Peter Stuyresant, and The Capture of André. His best known landscapes are: The Catskilk from Hillsdale, The Franconia Mountains, Franconia Notch, several views of Lake George, and Kauterskill Core. He was one of the founders of the National Academy of Design, and from 1845 until 1861 its president.

**Duran go**, a town in Mexico, capital of the state of Durango, about 500 mi. n.w., of Mexico, on an elevation 6,845 ft. above the sea. It is well built, has a cathedral, a mint, manufactures of cotton and woolen goods, leather, etc. Pop. 12,000. The state (area 42,530 sq. mi.) is partly mountainous and unproductive, but has valuable gold, silver, and iron mines, and also fertile tracts. Pop. 265,931.

Durant, HENRY TOWLE (1822-1881), philanthropist, was b. in Hanover, N. H. He was graduated at Harvard in 1841, and afterward read law. In 1846 he was admitted to the bar, and began practise in Boston. He became interested in the New York Belting and Packing Company, and in New York state iron mines, which ventures were very profitable. In 1863, he retired from the practise of law, relinquished the pursuit of wealth, and made New York City his residence. He then became impressed with the necessity of a college for the higher education of women, which conviction culminated in the establishment of Wellesley College.

Dürer (dü'rer), ALBERT (1471-1528), German painter, designer, sculptor, and engraver on wood and metal. In 1505 he went to Venice to improve himself in his art. He painted the Martyrdom of Bartholomew for St. Mark's church, which painting was purchased by the Emperor Rudolph and removed to Prague. Maximilian I appointed him his court painter, and Charles V confirmed him in this office. He invented the method of printing woodcuts with two col-Among his masterpieces in painting are a Crucifizion, Adam and Ere, an Adoration of the Magi, and portraits of Raphael, Erasmus, and Melanchthon, who were his friends. Among his best engravings on copper are his Fortune, Melancholy, Adam and Ere in Paradise, St. Hubert, St. Jerome, and the Smaller Passion (so called), in sixteen plates. Among his best engravings on wood are the Greater Passion (so called), in thirteen plates; the Smaller Passion, with the frontispiece, thirty-seven pieces; the Revelation of St. John with the frontispiece, fifteen plates; the Life of Mary, two prints, with the frontispiece.

**Du'ress**, in law, restraint or compulsion, is of two kinds: *duress of imprisonment*, which is imprisonment or restraint of personal liberty: and *duress* by menaces or threats (*per minas*), when a person is threatened with loss of life, or with some kind of injury. An act done under duress is voidable or excusable.

**Durga** (dur'gä), a Hindu divinity, one of the names given to the consort of Siva. She is generally represented with ten arms. In one hand she holds a spear, with which she is piercing Mahisha, the chief of the demons, the killing of whom was her most famous exploit; in another a sword: in a third the hair of the demon chief; and in others the trident, discus, ax, club, and shield.

Durham (du'ram), an ancient city and parliamentary borough in England, capital of the county of the same name, on the river Wear, which is crossed here by four bridges, 14 mi. s. of Newcastle. The principal public buildings are the ancient castle-now appropriated to the uses of the university-the cathedral, and other churches, the townhall, county prison, grammar school, etc. The educational institutions comprise the university, the grammar school, a training school for schoolmistresses, and other schools. There are manufactures of carpeting and mustard. The cathedral occupies a height overlooking the Wear. Pop. 14,863. DURHAM UNIVERSITY was founded in 1832, opened in 1833, incorporated by royal charter in 1837. The county is on the n.e. coast of England, having on the e. the German Ocean, on the n. Northumberland, from which it is divided by the rivers Tyne and Derwent, Cumberland on the w., and Yorkshire on the s., the

45

## Durham

river Tees parting the two counties. Its area is 647,592 acres, of which two thirds are under cultivation. In connection with the commerce of the county may be noticed its foundries, iron works, potteries, glass houses, iron shipbuilding, engine and machine works.

**Durham,** Durham co., N. C., 26 mi. n.w. of Raleigh. Railroads: Southern Ry.; Seaboard Air Line; D. & N.; Oxford & Clarksville, and New York & Western. Industries: tobacco factories, flour mills, two iron foundries, four cotton and two hosiery mills, snuff factory, two woolen mills, box, ice, soap, and numerous other factories. Surrounding country agricultural. The seat of Trinity College. The town was first settled in 1862 and became a city by change of charter in 1805. Pop. est. 1897, 9,000.

**Durmast**, a species of oak, so closely allied to the common oak as to be reckoned only a variety of it. Its wood is, however, darker, heavier, and more elastic, less easy to split, not so easy to break, yet the least difficult to bend. It is highly valued, therefore, by the builder and cabinet-maker.

Düsseldorf (dus' sel-dorf), a town of Prussia; in the Rhenish province, situated on the right bank of the Rhine, 22 mi. n.n.w. Cologne, one of the handsomest towns in the valley of the Rhine. It is a great focus of railway and steamboat communication, and has a number of handsome public buildings, and several remarkable churches. Among the public institutions, particular notice is due to the Academy of Art. It has the honor of having founded a school of painting, which takes the name of Düsseldorf, and has had a large number of distinguished pupils. The industries embrace iron, cotton, leather, tobacco, carpets, chemicals, objects of art, etc., and the trade is large. Pop. 115,190.

**Dutch**, the people and language of Holland, or the Netherlands.

**Dutch Clover,** commonly called white clover, a valuable pasture plant. It has a creeping stem; the leaflets are broad, obovate, with a horseshoe mark in the center; the white or pinkish flowers are in a globular head.

**Dutch Metal**, an alloy containing 84.5-84.7 per cent. of copper and 15.5-15.3 per cent. of zinc, with a fine golden-yellow color, ductile, malleable, and tenacious. When beaten out by a process analogous to that for gold leaf, until the sheets are less than 1-50,000th part of an inch thick, it constitutes Dutch leaf, or Dutch foil, and is used instead of gold leaf for ornamental purposes.

**Dutch Rush**, one of the plants known as horsetails, with a firm texture and so large an amount of silex in the cuticle that it is employed as a fine sandpaper for polishing delicate wood work.

**Duyckinck**, EVERT AUGUSTUS (1816-1878), editor, b. in New York. After graduation at Columbia, in 1835, he studied law, and was admitted to the bar in 1837. He traveled in Europe, and on his return edited, with Cornelius Mathews, a monthly magazine, Arcturus, a Journal of Books and Opinions, from 1840 till

1842. In 1847 he established The Literary World, which he conducted with his brother George until 1853. In 1853-56 he published with his brother the Cyclopardia of American Literature, to which a supplement was added in 1865, and of which a new edition was issued by M. Laird Simons in 1875.

**Dvorak** (dvor-shäk'), ANTON, a Bohemian musical composer, b. in 1841. He studied at the Prague Conservatoire and at Vienna. He has composed several operas on national Bohemian subjects, a number of songs, orchestral arrangement of Bohemian dances, several symphonies, a Stabat Mater, a cantata (The Speter Bride), and an oratorio (St. Ludmilla).

Dwarf, a term applied to any animal or plant greatly below the usual size of its kind. particularly to a human being of small dimen-Accounts of dwarf tribes have been sions. common from early times, such tribes being located especially in Africa; and it would appear from the accounts of Du Chaillu, Schweinfurth, and other travelers, that there are several dwarfish tribes throughout this continent. The Obongo, a race of dwarfs, are described as living in woods near the Okanda River, in wretched huts made of branches. Other races are the Mabongo, and the Akka dwarfs of Central Africa (see Akkas); and a race is said to exist in the Congo State, not as a distinct community, however, but mixed with other tribes. Individual dwarfs occur in all races, and were formerly a fashionable appendage to the courts of princes and the families of nobles. Jeffery Hudson, the favorite dwarf of Charles I. at the age of thirty is said to have been only 18 in. high, though he afterward grew to 3 ft. 9 in. Bébé, the celebrated dwarf of Stanislas of Poland, was 33 in.; Wybrand Lolkes. a Dutch dwarf, when sixty years of age was only 27 in.; Charles H. Stratton, "Gen. Tom Thumb," was 31 in. high at the age of twentyfive; Francis Flynn, "General Mite," was only 21 in. at sixteen.

**Dwarfing**, the process of training up trees or shrubs for ornament in houses so us to cause them never to reach more than a very small size, by keeping them in poor soil; giving them little water, pinching off strong shoots, etc.: practised among the Chinese and Japanese.

practised among the Chinese and Japanese. **Dwight** (dwit), TIMOTHY (1752-1817), American divine, b. in Massachusetts. His father was Col. Timothy Dwight, and his mother was a daughter of Jonathan Edwards. He served as chaplain in the Revolutionary army, and ultimately became president of Yale College. His *Theology* (1818) was for long a standard both in Britain and in America. He was also the author of two poems, the Conquest of Canaan, and Greenfield Hill, besides numerous unimportant works, consisting of dissertations.

**Dwight,** THEODORE (1764-1846), journalist, b. in Northampton, Mass. He studied law, was admitted to the bar, and became engaged in many of the political controversies as a Federalist. After serving in the state senate he was elected to Congress in 1806. He edited the Hartford *Mirror* during the War of 1812. In 1815 he became editor of the Albany Daily Advertiser, and in 1817 he removed to New York, where he founded the Daily Advertiser, which he edited until 1836. He published A History of the Hartford Convention (1833), and the Character of Thomas Jefferson . as Exhibited in His Own Writings (1839).

Dwina, Northern, a Russian river formed by the union of two small streams in the government of Vologda. It flows in a northwesterly direction, and falls by four mouths into the White Sea. At Archangel, before it divides itself, it is 4 mi. broad. It is navigable as far as Suchona, and is connected with the Volga by canal.

Dy'aks, the aborigines of Borneo, chiefly inhabiting the interior of the island. They are a finely formed race, of a yellow complexion, and are described as docile, industrious, and superior to the Malays. The more advanced of them practise agriculture and dwell in neatly constructed and tolerably comfortable houses. In Sarawak they have made considerable advances in civilization. They are mostly heathens. Head-hunting (hunting their enemics to make trophies of their heads) is practised among them, but has been abolished where European influence prevails.

**Dyaus** (dyous), the god of the sky in the older mythology of the Hindus. His name is etymologically connected with that of the Greek Zeus.

**Dyeing** is the art of fixing a new and permanent color on textile substances, usually cotton, linen, silk, and wool. Some preliminary operations are necessary in order to cleanse the stuff from any foreign matters which would prevent the dye having free access to it, as well as to remove any natural coloring which would interfere with the production of bright, clear tints. Cotton and linen fabrics go through a prolonged series of operations in bleaching. Silk is boiled in a solution of fine soap to remove the fatty matter; and wool is cleansed by scouring in weak soap or soda lye or weak ammonia.

The process of dyeing varies much according to the stuff and the coloring matters used. In general animal fibers, like silk and wool, combine more easily with most colors than vegetable fibers, such as linen and cotton. In the case of the former, for example, a simple immersion in aniline dyes is sufficient to produce a fixed color. Such colors are said to be substantive, in relation to the stuffs with which they thus combine. Dyes which will not unite directly with the fibers so as to produce a good and permanent color, are termed adjective. These dyes require the intervention of another agent to fix them on the different stuffs, and the name of *mordunt* is applied to those substances which are employed to make the stuff to be dyed and the dying color combine. Alum, acetate of alumina, chloride of tin, salts of iron, albumen, gluten, tannin, etc., are com-mon mordants. The mordant is generally dissolved in water into which the stuffs to be dyed are plunged. In some cases it is mixed with the color and both are simultaneously applied

to the stuff. An important characteristic of mordants is their power of affecting the natural tint of the dye and thus enabling a variety of shades to be produced at small expense. Thus nitrates tend to give a yellow tinge to the colors, alumina deepens and, oxide of tin brightens the natural tints. A process of dyeing to which the name of Aero-hydraulic Dyeing has been given, consists in forcing the color through the material by hydraulic pressure. The advantages of the process (patented by G. C. Gibbs) are that the color is forced equally through any thickness of the stuff, which thus remains bright till completely worn out.

The dye stuffs in use at the present day are derived alike from the animal, mineral, and vegetable kingdoms. Among animal dyes cochineal, the female insect of Coccus cacti, produces the most valuable of scarlet and crimson dyes. A kindred insect, Coccus ilicis, produces kermes, an important red dye. Galls, which are used both as a dye and a mordant, are produced by the puncture of insects on the leaves and branches of the oak and other trees. Among the vegetable dyes in common use, madder, the root of the Rubia tinctoria is perhaps the most important, furnishing various shades of red. purple, brown, and black, as well as the famous Turkey red. *Munjet* is the root of a closely allied Indian plant. Logwood, Brazil wood, sandalwood, fustic, sappan wood, are the chief woods used for dyeing purposes. For blue dyes, indigo, obtained from Indigofera tinctoria and Indigofera Anil, is still the most generally used. Safflower yields a fine pink dye; various species of lichens give us a series of purple dyes known as archil, cudbear, and litmus. Among mineral pigments Prussian blue, a ferrocyanide of iron; ultramarine, now prepared as a compound of alumina, silica, soda, and sulphur; chrome yellow, cobalt blues, and arsenical greens, are the colors most in use. Among the most notable additions to the list of coloring stuffs within recent years are the aniline dyes of coal-tar origin which yield a great variety of brilliant colors, such as magenta, mauve, aniline, purple, roseine, vio-line, etc. There are few organic substances which under proper treatment will not yield coloring matter, and of late new coloring matters have been obtained from wood sawdust, lichens, mosses, paper and cotton waste, bran, starch, sugar, soot, etc. In addition to those above mentioned, other dye stuffs are alkanet, annatto, catechu, camwood, French berries, divi-divi, sumach, saffron, turmeric, woad, etc.

**Dyer's weed**, a plant of the same genus as mignonette, otherwise called *Yellow weed*, *Weld*, or *Woud*, nat. order Resedaceæ. This plant grows in waste ground: it affords a beautiful yellow dye, and is cultivated for that purpose.

**Dynam'eter**, an instrument used for measuring the magnifying power of telescopes. It consists of a small compound microscope, with a transparent plate, exactly divided, which is fixed to the tube of a telescope, in order to measure exactly the diameter of the distinct image of the eye-glass. Also same as Dynamometer.

**Dynamic Theory**, a theory explanatory of the essential constitution of matter. In the dynamic theory every body is considered as a space filled with continuous matter; porosity then becomes an accidental quality, but compressibility and dilatability essential properties. The state of a body depends entirely on certain attracting and repelling forces; and its volume must change with every change in the relative proportions of these forces. It is opposed to the *atomic theory*, which supposes every body to be composed of indivisible and impenetrable particles termed *atoms*. These are almost infinitely small, with void spaces between them, so that this theory makes porosity essential to matter.

Dynam' ics is the science which deals with the laws of force in their relation to matter at rest or in motion, and as such it is differentiated from *kinematics*, which considers motion mathematically, and apart from the forces producing it. It is to Newton that we owe the clear statement of the three primary laws of force. These are: 1, That every body remains in a state of rest, or of uniform motion along a straight line, unless it is compelled by force to change that state. 2, That change of motion is in proportion to the force employed, and occurs along the straight line in which the force acts. This change of motion includes both change of rate and of direction. 3. That, as the result of every action, there is also and always an equal reaction. These laws, which were formulated from experi-ment, involve the conception of force as a primary influence or action expressed in terms of space, time, and matter. Now, in dealing with the laws of force, a standard of measurement is required which shall be applicable to all forces at all times, and we therefore require to begin by establishing units of space, time, and mass. There are two systems of units in use, the one British, the other French. In the British system the foot is taken as the unit of length, and the second as the unit of time. In the French the centimeter is the unit of length, the second the unit of time; the unit velocity in the one case being that of one foot per second, in the other one centimeter per second. The British unit of mass is the pound (the mass of a certain iump of platinum deposited in the exchequer office, London); the French the gram; and accordingly the French units of space, mass, and time are commonly known as the C. G. S. (centimeter, gram, second) units. As the weight of a pound (or a gram) is not the same at all parts of the earth's surface it cannot give us of itself an absolute or dynamical unit of force, that is, an invariable unit; but unit velocity, we do obtain such a unit. Two absolute units of force are in common use in dynamics, the *poundal* and the *dyne*; the latter being the absolute unit in the C. G. S. system. The former is that force which, acting on the mass of one pound for one second, generates in that

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mass a velocity of one foot per second. The latter is that force which, acting on the mass of one gramme for one second, generates in that mass a velocity of one centimeter per second. It is important in dynamics to distinguish between mass and weight. The mass of one pound is the quantity of matter equal to a certain standard quantity (a certain lump of metal) and is quite independent of force. The *weight* of one pound is the force with which the mass of one pound is attracted to the earth's surface by the force of gravity. Another important term is momentum: the momentum of a body in motion at any instant is the product of the mass of the body and the velocity at that instant. Dynamics is divided into two great branches: statics, which treats of solid bodies at rest under the action of forces; and kinetics, which treats of the action of forces in producing motion in solid bodies. Formerly the latter alone was called dynamics, and to this, in conjunction with statics, the general name mechanics was given. In the wide sense dynamics includes also hydrostatics.

Dy'namite, an explosive substance patented by A. Nobel in 1867. As originally made it consists of a siliceous earth obtained at Oberlohe in Hanover and known as kieselguhr, impregnated with 75 per cent. of nitroglycerine, the object of the mixture being to facilitate the carriage and use of the substance by diminishing its susceptibility to explode by shock while not destroying its explosive force. The siliceous matter is of diatomaceous origin: it is extremely friable and porous, and has a considerable absorbent power. Dynamite thus prepared has the appearance of raw sugar. Diatomite, a substance superior to kieselguhr. is now also employed, and various other substances have been used to mix with the nitroglycerine, such as charcoal, sand, sawdust. etc. The mixture remains without change for any length of time, unless exposed to water. It burns away quietly if a light is applied to it, but explodes if heated to a high tempera-ture. Usually it is exploded by a specially arranged fulminating cap. Its explosive force is several times that of gunpowder, which it has largely superseded for blasting.

A dynamite cartridge is about eight inlong and one and a quarter in. in diameter, and weighs about half a pound. Before dynamite can be made the manufacturer must make nitroglycerine, gun cotton, and other explosives. Nitroglycerine is the most powerful explosive yet invented. Glycerine made by soap makers is the basis of nitroglycerine. This is brought to the factory in tank cars and forced by compressed air into storage tanks where it is kept until needed. The factory is usually an isolated building constructed of wood, with no stone or bricks, so that in case of explosion the danger is decreased. The mixture of glycerine, nitric and sulphuric acid, which make nitroglycerine is made in a lead vat. The acids are first mixed and then the glycerine in the form of a fine spray is introduced. The chemical reaction produces heat and the process has to be carefully

watched in order to prevent too high a temperature. When the mixture has cooled it is drawn off. Nitroglycerine is an oily, sweettasting mixture, and so poisonous that severe headaches are caused by simply handling it. Pure nitroglycerine cannot be safely shipped and is seldom used in any form except for cleaning oil wells, and then it is mixed on the spot, placed in tin cartridges, and dropped into the well. When mixed with other substances, however, it may be handled with comparative safety. It is usually mixed with a preparation known as "dope"—a combination of nitrate of soda, wood pulp, and magnesia. This mixture is made in a trough and is then made into cartridges known as dynamite cartridges. The explosive power of dynamite depends upon the proportion of nitroglycerine to the "dope." For ordinary rock blasting about 40 per cent. of nitroglycerine to 60 per cent. of the "dope" is used. Sometimes 75 per cent. of glycerine to 25 per cent. of "dope" is used in breaking up salamanders which form in blast furnaces and in heating furnaces used in making iron. Dynamite is exploded by a cap which is placed in the cartridge just before it is lowered into the hole. Safety fuses and electricity are used for exploding the cap. The fuse is so constructed that it burns three, five, or ten minutes as desired before the cap explodes, and the cap is fired by electricity by sending a current through the platinum wire which is in the cap and which grows white hot when the current is turned on. For some blasting and tunneling gun cotton is used. This is a mixture of nitroglycerine, cotton or wood cellulose, and resembles in looks soft It gives out less fumes than dynagelatin. mite and the fumes do not cause headache. Nitroglycerine is less than fifty years old, be-ing discovered in 1847 in Paris. For several years after its discovery it remained simply as a feared explosive and was made only in small quantities by chemists. It was soon discovered, however, that it could be handled safely by mixing with other ingredients to form dynamite.

Dy'namo, the name now usually given to what was originally called the dynamo-electric machine. The object of such machines is to produce electric currents by means of mechanical power, and they differ from magneto-electric machines, which have a similar object, by the circumstance that in place of the permanent steel magnets which form a necessary part of a magneto-electric machine, electro-magnets are employed. In the original dynamo-electric machines the current by which the electromagnets were made was identical with the current given off by the machine, or else was a portion diverted from it; but in an important class of machines the current which makes

### Dzoungaria

the electro-magnets has an independent source, and to these machines the name "dynamo" is also applied. The advantage of dynamo over magneto machines lies in their greater compactness, arising from the fact that electro-magnets are much stronger than permanent steel magnets of the same bulk. The extensive use of dynamos as the principal commercial sources of electric currents may be said to date from the improvements introduced in their construction by Gramme of Paris. The armatures of the monster dynamos built by the Westinghouse Company for the World's Fair weighed about 21 tons each, and were about 71 ft. in diameter. The total weight of the twelve dynamos was 900 tons, having a maximum capacity of 180,000 lights, and requiring engines with an aggregate of about 12,000 horse power to work them. The dynamos of the Deptford Central Station, London, are, however, the largest and most wonderful electrical machines in the world. The armature ring for each of the 10,000 horse-power dynamos measures 35 ft. in diameter. It is made of cast-iron in eleven pieces. The armature and shaft weigh 225 tons, and the field magnets 350 tons more. This is exclusive of the massive bed-plate on which the engines and field magnets stand.

**Dynamom** eter, any instrument for measuring the relative strength of men or animals, or the force of machinery. Commonly it consists of a spiral spring suitably applied. When the pull upon a draught implement, as a plow for instance, is the point to be determined, the dynamometer is made a link in the draught chain, and the amount of extension or collapse which it suffers indicates the intensity of the strain.

**Dys'odile**, a yellowish or greenish foliated mineral found in limestone, with remains of fish and of plants, which, when ignited, burns and emits a very bad smell.

**Dze'ren** (dze'ron), the Chinese antelope, a remarkably swift species of antelope inhabiting the dry arid deserts of Central Asia, Thibet, China, and Southern Siberia. It is nearly 44 ft. in length, and 24 high at the shoulder.

ft. in length, and 21 high at the shoulder. **Dzig' getai** (or Kiang), an animal found in Central Asia, allied both to the horse and ass. Its head is large like that of the ass, but in form resembles that of the horse. The ears also resemble those of the horse, It runs with a rapidity exceeding that of the best Arabian horses.

**Dzoungaria**, a Chinese territory in Central Asia. It has an area of 147,950 sq. mi., and pop. 600,000. It is administratively connected with Kuldja. and since the surrender of Kuldja by the Russians in 1880 is again under Chinese rule. Dzoungaria, once the center of an independent empire, was first conquered by the Chinese in 1757.

## Eads

E, the second vowel and the fifth letter of the It occurs more frequently English alphabet. in English words than any other letter of the alphabet. Its long or natural sound in English coincides with the sound of i in the Italian and French languages, as in here, mere, me. It has also another principal sound, a short one, heard in met, men. It has besides a sound like a in bare, as in there, where, etc., and the obscure sound which is heard in her. As a final letter in English it is generally silent, but it serves to indicate that the preceding vowel is to have its long sound, as in mane, cane, plume. When two e's come together the sound is generally the same as that of the single e long, as in deem, esteem, need.

Eads, JAMES BUCHANAN (1820-1887), civil engineer; b. at Lawrenceburg, Ind. At the age of thirteen he went to St. Louis, Mo., and became clerk on a steamboat. In 1842 he constructed a diving-bell boat, which was employed in recovering cargoes from sunken ves-sels. This invention brought him a fortune, and a few years later he erected the first glass works west of the Mississippi River. He constructed eight light-draught ironclads, first used at Fort Henry 1862. The same year he designed six bullet-proof propellers with turrets worked by steam, the first application of steam to the manipulation of heavy guns. From 1867 to 1874 he was engaged in designing and constructing the famous "Eads bridge' over the Mississippi River, connecting St. Louis and East St. Louis. This was a great piece of engineering. Eads was the promoter of many improvements along the Mississippi River, especially at New Orleans, where he cut a channel through South Pass 200 ft. wide, with a central depth of not less than 30 ft. He d. at Nassau, Bahama Islands.

Eagle, the general name of raptorial birds that form a group or sub-family (Aquilinæ) of the great family Falconidæ, which includes the eagles, falcons, and hawks. The eagle is popularly regarded as the noblest and most courageous of the rapacious birds. It soars to a greater height than any other bird, from which circumstance the ancients considered it as the bird or messenger of Jove. The genus Aquila which includes the most typical eagles, is distinguished by its long and powerful bill, the curve commencing at the cere, by its wings reaching to the tip of the tail, and by its tarsi being feathered to the toes. The imperial eagle is probably the species to which the popular belief in the courage, strength, and nobleness of eagles is to be traced.  $\mathbf{The}$ golden eagle measures over 6 ft. from tip to tip of the expanded wings, and 3 ft. from the beak to the end of the tail. The adults have the body brownish, becoming darker with age; the feathers of the head and neck pointed,

# Eagle

and of a golden-red hue. This species is found all over the northern hemisphere. It was once common in the Highlands of Scotland, but is now becoming rare. The Kirzhis and other tribes of Central Asia use the golden eagle to kill antelopes, foxes, and even wolves. Another is the erne or sea-eagle, found near the seacoast or lakes, and feeding largely on fish. The general color is gravish-brown, the head pale-colored, the tail white. The bald



Eagle Hawk

eagle, found in North America and Northeast Asia, is the symbol of the U. S. Like all members of the genus his diet is less restricted than that of the true eagles; and he even takes carrion. Another is the serpent eagle, or short-toed eagle, which ranges through Southern Europe, Asia, and especially North Africa. In structure and habits this bird approaches the buzzards.

Eagle, as a symbol. The eagle first appears as a war standard among the Persians, through whom it reached the Egyptians. As the standard of the Roman armies it was first used by Marius, and latterly took the place of all the other emblems at the head of the legions. It was first made of wood, then of silver, and finally, under Cæsar and his successors of gold. In the mediæval ages the eagle became the heraldic emblem of the old German Empire. and was made double-headed in the fourteenth century. When the old German Empire ceased the double-headed eagle was retained by Austria. A double-headed eagle is also the national military symbol of Russia, as a singleheaded eagle is that of Prussia and the U.S. The latter stands with outspread wings guarding a shield, with the motto E pluribus unum.

The eagle is also the badge of several orders. Eagle, a gold coin in the U. S. of the value of ten dollars. It was first coined in 1795. There



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are also half-eagles, quarter-eagles, and double eagles, of proportionate values. Eagle Hawk, a name of birds belonging to

the eagle group, but smaller than the true eagles, with comparatively short wings and long legs, natives of South America.

Eagle Owl, one of a sub-family of owls, the most remarkable species of which is the great horned owl, little inferior in size to the golden



Eagle Owl.

eagle. It is found in the mountainous parts of Central Europe. An allied species, the Virginian horned owl is found in almost every quarter of the U.S.

Eames, EMMA (Emma Hayden Story), American soprano singer, b. in Shanghai, China, 1868. Her parents were visiting in China at the time. She studied music in Boston and Paris and made her debut in 1889 as Juliette. She married Julian Story in London in 1891. She is very popular.

Ear, the organ of hearing. It is situated at



Sectional view of the external, middle, and inter-

sectional view of the external, infante, and inter-nal Ear, showing the interior of the Auditory Canal, Tympanic Cavity, and Eustachian Tube. a, The auditory canal; b, the tympanum; c, the Eu-stachian tube, leading to the pharynx; d, the coch-lea; e, the semicircular canals and vestibule, seen on their exterior by the removal of the surround-ing bony tissue; f, auditory nerve; g, temporal bone. bone.

the side of the head, and in the higher vertebrates is divided into the outer, middle, and inner ear. See Anatomy.

Early, JUBAL A. (1816-1894), general, was b. in Franklin co., Va., and graduated at West Point in 1837. He served in the Florida and In the Civil War he fought Mexican wars. against the Union in the battles of Fredericksburg, Chancellorsville, and Gettysburg: he also commanded in the Shenandoah Valley, where he was defeated by Sheridan. His want of success compelled General Lee to remove him from command. Since the war a manager of the Louisiana lottery.

Earring, an ornament for the ear, consisting of a ring or hook passing through the lobe. with a pendant of diamonds, pearls, or other jewels frequently attached. Earrings were commonly worn among the Oriental nations, and by both sexes, from the earliest times. Among the Greeks and Romans they were not so commonly worn by men as by women.

Earth, the planet which we inhabit, a nearly spherical body which every twenty-four hours rotates from west to east round an imaginary line called its axis-this axis having as its extremities the north and south poles respectively -while in the course of a year it completes a revolution round the sun. To an observer whose view is not obstructed any part of the earth presents itself as a circular and horizontal expanse, on the circumference of which the heavens appear to rest. Accordingly, in remote antiquity, the earth was regarded as a flat, circular body, floating on the water. But even in antiquity the spherical form of the earth began to be suspected. It is only on this supposition that we can explain how the horizon of vision grows wider and wider the higher the position we choose, how the tops of towers and mountains at a distance become visible before the bases, how the hull of a ship first disappears as she sails away, and how as we go from the poles toward the equator, new stars become visible. Besides these proofs there are many others, such as the circular shadow of the earth seen on the moon during an eclipse, the gradual appearance and disappearance of the sun, and, lastly, the fact that since 1519 it has been regularly circumnavigated.

The earth is not, however, an exact sphere, but is very slightly flattened at the poles, so as to have the form known as an oblate spheroid. In this way the *polar diameter*, or diameter from pole to pole, is shorter than the diameterat right angles to this-the equatorial diameter. The most accurate measurements make the polar diameter about 27 mi. less than the equatorial, the equatorial diameter being found to be 7,925.6 mi., and the polar 7,899.14. The earth is regarded as divided into halves-the northern and the southern hemisphere - by the equator, an imaginary line going right round it midway between the poles. In order to indicate with precision the position of places on the earth additional circles are imagined to intersect one another on the surface in such a manner that those of the one set all pass

through both poles, while those of the other are drawn parallel to the equator. The former are called *meridians*, the latter *parallels of latitude*, and by them we can tell the latitude and longitude, and thus the exact position of any place.

Many experiments by various methods have been made in order to determine the average density of the earth, that is, the quantity of matter it contains. Among these methods may be mentioned: 1, that of determining the attraction of a mountain on the direction of a plumb line and calculating from thence the density of the earth; 2, that founded on the difference of oscillation in a pendulum when placed at the summit of a mountain and when at the sea level; 3, the converse of the preceding method, by the determination of the difference of gravity at the top and the bottom of a deep mine, by pendulum experiments; 4, Cavendish's experiment with the torsion balance, which attempts to compare the attractive force of two large lead balls over other two small lead balls with that exercised by the earth. From these and other experiments it has been calculated, taking the mean of all results, that the density of the earth is to that of water as 5,639 to 1.

The earth, in common with the other planets, moves around the sun, completing its revolution in about 365 days and 6 hours, and thus forming our common year. The orbit of the earth is an ellipse, with the sun in one of its foci. Hence the earth is not equally distant from the sun in all parts of the year; being about 3,000,000 mi. nearer at one time than another, its least distance, according to recent calculations, being 89,897,000 mi., its greatest, 92,963,000, and the mean distance, or half the length of the long axis of the orbit, 91,430,000 mi. From this it may be calculated • that the velocity of the earth in its orbit is about 17 mi. a second. In winter (speaking of the northern hemisphere) the earth is nearest the sun and in summer farthest from it: for the difference in the summer and winter temperature is not occasioned by the greater or less distance of the earth from the sun, but by the more or less oblique direction of the sun's rays. The passage of the earth round its orbit causes the sun to appear as if it described a similar orbit in the heavens; and hence it is that at one time of the year one group of stars is seen in the neighborhood of the sun at sunrise and sunset and at another time another group. This apparent path of the sun is the *ecliptic*, and corresponds with what would be the path of the earth as seen from the sun; and the groups of stars through which the sun successively passes form the zodiac.

The earth's daily motion about its own axis takes place, according to mean time, in twenty-three hours, fifty-six minutes, and four seconds. As the axis on which the earth performs its diurnal rotation forms with the plane of its path about the sun an angle of  $23\frac{1}{2}^{\circ}$  (which angle also represents that between the plane of the ecliptic and the plane of the earth's equator), the sun ascends in the heavens from March 21 to June 21 (the summer solstice), about  $23^{12}$  above the equator toward the north pole, and descends again toward the equator from June 21 to September 23; it then sinks till December 21 (the winter solstice), about 2310 below the equator, toward the south pole, and returns again to the equator by March 21. This arrangement is the cause of the seasons, and the inequality of day and night attending them. For all countries lying beyond the equator, day and night are equal only twice in the year (at the equinoxes). At the summer solstice the north pole of the earth is turned toward the sun, and the south pole away from it, and for  $231^{\circ}$  round the former there is a period of longer or shorter duration during which the sun is continually above the horizon for more than twenty-four hours, while round the latter is an equal extent of surface within which the sun for similar periods is below the horizon. The reverse state of matters occurs at the winter solstice. The circles bounding these regions are called respectively the arctic and the antarctic circle, and the regions themselves the polar or frigid zones. Throughout a region extending to 231° on each side of the equator the sun is directly overhead at every point in succession twice in the year. The circles which bound this region are called the tropics, that in the northern hemisphere being the tropic of Cancer, that in the southern the tropic of Capricorn, while the region between is the torrid zone. The regions between the tropics and the polar circles are respectively the north and south temperate zones.

From the evidence furnished by volcanoes, hot springs, sinking of mines, etc., it is known that the earth has a high internal temperature of its own. Taking the average of the various observed rates of increase this temperature seems to increase 1° F. for every 60 ft. of descent. Assuming this to continue, the rocks at a depth of 2 mi. would be as hot as boiling water, and at a depth of 50 mi. the heat would be such as at the surface would melt every known solid. This being so, various theories as to the internal condition of the earth have been proposed: 1, That a thin envelope or crust surrounds a molten interior. It can be shown, however, that as tides must be produced in such a molten mass the cool outer crust would be unable to withstand the enormous force of these unless it were about 2,000 mi. thick. 2, That the interior is solid, with spaces here and there filled with liquid or gaseous material. This theory assumes that there are within the earth enormous cavities filled with molten rock, which escapes, when local pressure is removed, in the form of volcanic outbursts. 3, That the earth consists of a thin crust, a large solid nucleus, and a liquid film between the nucleus and the crust; the temperature at the center being not much greater than comparatively near the surface. 4, That the earth is solid to the center, but any part may become liquid if local pressure is removed. We know that if the pressure on a solid be increased the melting point is correspondingly raised; now the pressure at the center of the earth, or even at the depth of 50 or 100 mi., must be something enormous, and probably is so great as to keep the rocks there permanently in a solid condition, notwithstanding the heat. This last theory is considered the most probable. On the supposition of its correctness volcances might be explained by supposing that at certain points here and there pressure is removed by the elevations of portions of the earth's surface which are constantly taking place, and that this allows the rocks to liquefy. Water may then soak down to these liquid rocks, and being converted into steam produce the various volcanic phenomena.

The earth is believed to have condensed and solidified from a gaseous or nebular condition, and to have once had a far higher temperature than now. If such were the case the outer surface, losing heat by radiation, would be the first part to cool quickly; while the interior, losing its heat by conduction, would not cool so rapidly, and therefore would naturally have a higher temperature than the portion at the surface. This is what all observations indicate the condition of the earth to be, and the shape of the earth also indicates that it must once have been in a fluid state.

Another feature that the earth as a whole presents is its magnetism. When a magnetic needle is balanced on a point it remains at rest in one position only, pointing then nearly due north and south. This can be explained only on the supposition that the earth acts as a great magnet. It has in fact two poles—a north and a south magnetic pole—which are not very far from, but by no means coincident with, the geographical poles. There is also a neutral line or magnetic equator, which does not greatly diverge from the geographical equator. The earth acts upon all magnets as they act upon each other, and it is for this reason that they point north and south.

The surface of the earth contains over 196,-000,000 sq. mi., of which scarcely a third part is dry land, the remaining two thirds being water. The land is arranged into masses of irregular shape and size, the greatest connected mass being in the eastern hemisphere. The chief masses receive the name of continents, detached masses of smaller size forming islands. The surface of the land is variously diversified, exhibiting mountains, valleys, plains, plateaus, deserts, etc. The water area of the earth is divided into oceans, seas, bays, gulfs, etc., while rivers and lakes may be regarded as features of the land surface. The great phenomena of the oceans are currents and tides. The population of the whole earth is estimated at from 1,350 to 1,450 million. The earth is attended by the moon as a subordinate or subsidiary planet.

Earth Currents, violent electrical disturbances of the nature of transient currents, which rush in one direction or the other, and by which telegraph lines, and particularly long submarine lines, are constantly troubled. Their origin and nature are not thoroughly

## Earthquake

understood, but they are found to be very intimately connected with the perturbations of terrestrial magnetism called *magnetic storms*, and these, it is well known, are closely connected both with the appearance of the *aurora borealis* and with the occurrence of the sun's spots.

Earthenware, a name applied to the commoner sorts of pottery ware. The older kinds of earthenware, such as Majolica, Delft ware. Faience, and Palissy ware, are not only glazed, but are besides elaborately colored and enameled and ornamented with raised figures of various kinds.

**Earth-nut**, an umbelliferous plant. The leaves are ternately divided, and the small white flowers are in terminal umbels. The tuber or nut is about 4 or 6 in. below the surface, at the termination of a long slender root. It is brown, the size of a chestnut, of a sweetish, farinaceous nature, resembling in taste the common chestnut. Swine are very fond of the nuts, and fatten rapidly where they are abundant.

Earthquake, a shaking of certain parts of the earth's surface, produced by causes not perceivable by our senses. This motion occurs in very different ways, having sometimes a perpendicular, sometimes a horizontal undulating, and sometimes a whirling motion. It also varies much in degrees of violence. from a shock which is hardly perceptible to one which bursts open chasms and changes the appearance of the ground itself. During these shocks sometimes smoke and flames. but more frequently stones and torrents of water, are discharged. There is little doubt that earthquakes and volcanic eruptions are kindred phenomena, the latter differing from the former principally in proceeding from a permanent crater. All observations go to prove that both are due to disruptions produced by internal heat at a great depth beneath the surface of the earth. Of the particular way in which this force works, however, there are various theories. It has been thought by some that the center of earthquakes and volcanic disturbances is always near the sea or other large supplies of water. and that the disturbances are directly caused by the filtration of the water down to igneous matter, and the consequent generation of vast quantities of steam which frees itself by explosion. Others have sought to explain earthquakes as part of the phenomena of a planet cooling at the surface. The steady contraction of matter caused by the decay of heat would be likely to produce large cavities with an increasing tension of the neighboring strata. till a tremendous subsidence, involving convulsions reaching to the earth's surface, re-The most remarkable moved the strain. earthquakes of modern times are those which destroyed Lima in 1746, and Lisbon in 1755: still more recent are the earthquakes that visited Calabria in 1857, Peru and Ecuador in 1868, the island of Ischia in 1884, Charles-ton and that district of the U.S. in 1886. Menton and the Riviera of Italy in 1887.

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## Earths

Earths, a term applied to certain tasteless, inodorous, dry, uninflammable, nonvolatile, insoluble substances, difficultly fusible, and of a moderate specific gravity, which constitute by far the greatest part of the gravel and soil that go to make up the mountains, valleys, and plains of our globe. They include lime, baryta, strontia, magnesia, alumina, etc. The earths were regarded as simple bodies until Sir H. Davy proved them to be compounds of oxygen with metals.

Earth Shine, in astronomy a name given to the faint light visible on the part of the moon not illuminated by the sun, due to the illumination of that portion by the light which the earth reflects on her. It is most conspicuous when the illuminated part of the disc is at its smallest, as soon after new moon. This phenomenon is popularly described as "the old moon in the new moon's arms."

Earth Tremors, slight vibrations of portions of the earth's surface that may be noted by means of special instruments, their cause not being known.

Earthworm, a genus of common worms, order Oligochæta, belonging to the abranchiate (having no branchize, or external respiratory organs) section of the class Annelida. They have a long, cylindrical body, divided by transverse furrows into numerous rings. The mouth is destitute of teeth, and they have no eyes, tentacles, or cirrhi. They are hermaphrodite. The common earthworm attains nearly a foot in length. It subsists on roots, woody fibers, animal matter, etc. It moves by the



Common Earthworm.  $\sigma$ .—Young Worm Escaping from the Cocoon.

contractions of successive parts of the body aided by a double row of bristles. They are of great service to the agriculturist by loosening the soil and increasing its depth. This is chiefly the result of their mode of nourishment, since they deposit the soil they have swallowed, after digestion, in heaps called *worm castings* which brings up rich fine soil to the surface, gradually covering the upper layer sometimes to the extent of several inches.

Earwig, a common insect whose name is derived from its supposed habit of insinuating itself into the ears of persons.

East Cape, the most easterly point of Asia, projecting into Bering's Strait nearly opposite Cape Prince of Wales in Alaska.

Easter, the festival commemorating the resurrection of Christ, observed in many branches of the Christian church. By the

first Christians it was considered to continue the feast of the Passover, at which the paschal lamb, a type of Christ, was sacrificed. Hence its name in Greek, French, and other Romance languages is taken from the pesach, Hebrew The passover. English name comes from the Anglo Saxon *Eostre*, a goddess

whose festival



Common Earwig. of light or spring, a.-Larva; b.-Pupa; c.-Perfect whose festival Insect.

was celebrated in April. There was long a dispute in the Christian church as to the proper time for holding Easter, the Christians of the East celebrating it on the same day as that on which the Jewish Passover fell, that is, the 14th of Nisan, while the majority of the church celebrated it on the Sunday next after this day. The controversy was decided by the Council of Nice in 325, which settled that it was to be reckoned as at present, namely, that Easter is the first Sunday after the full moon which happens upon or next after March 21, and if the full moon happens on a Sunday, Easter day is the Sunday after, but, properly speaking, for the "full moon" in the above the "fourteenth day of the moon" should be substituted.

Easter Island, an island in the South Pacific Ocean, lon. 1090 17' w.; lat. 270 6' s. It is of a



Stone Statues on the side of the Volcano Ronororaka, Easter Island.

triangular form, one side about 12 mi. long, the other two about 9 each; highest point, 1,200 ft. The soil is fertile, but little cultivated. There are some remarkable sculptures on this island, consisting of gigantic stone images in great numbers. The greater part of the island be-



longs to an Englishman, and is utilized as a grazing farm for sheep and cattle. The inhabitants now number about 150, the bulk of them being recently transported elsewhere.

**Eastern Question**, the name given to the diplomatic and national interests affected by the gradual retrocession of the Turkish Empire in Europe, and the problem of disposing of the territory thus left, or presumably to be left. Bulgaria, Roumania, Servia, and Greece are the new states which have naturally arisen on the withdrawal of the Turkish power, and their history in connection with the respective policies of England, France, Austria, and Russia toward them is the history of the phases of the "Eastern Question" so far. The Crimean War of 1854-56 with the Treaty of Paris which followed after it, and the Russo-Turkish War of 1877-78 with the Treaty of Berlin, the Armenian massacres of 1806, and the Turko-Grecian War of 1807. are among the notable events connected with this subject.

**Eastern Roumelia**, a portion of the Turkish dominions in Europe lying on the south of Bulgaria, from which it is separated by the Balkan Mountains; area 13,500 sq. mi. The country is fertile, but agriculture is backward; wheat, wine, tobacco, etc., are produced; timber is abundant. The chief town is Philippopolis. E. Roumelia was constituted an autonomous province of Turkey by the Treaty of Berlin in 1878, but recently attached itself to Bulgaria. Pop. 975,000.

East India Company, a great English company, originally simply a trading association, which played an important part in the history of Hindustan. It was formed in 1590 in London, with a subscribed capital of about \$150,-000, for the purpose of trade with the East In-A charter was granted to it by Queen dies. Elizabeth on Dec. 31, 1600, for fifteen years, renewable for a similar period. In this charter the company is styled the "Governor and Company of the Merchants of London trading into the East Indies." In 1609 the charter was renewed by James I, and made perpetual, reserving power to the crown to recall it at three years' notice. Additional power was granted to the company of seizing and confiscating ships and goods of contraband traders, either in the British dominions or in any of the places where they were authorized to trade. The charter, which expired in 1780, was renewed till 1791. The renewal act provided that the company, which was already bound to submit to the government all dispatches received from India, should submit for approval all dispatches proposed to be transmitted thither. In 1813 the charter was renewed on condition that the right of exclusive trade should be restricted to China, while the Indian trade should be thrown open to all British subjects. The renewal of the company's charter in 1834 took place amid continued opposition to their mercantile, and even to their legislative privileges. The stock was valued at \$30,000,000, which was to bear interest at 10 per cent. and be redeemable after April 30, 1874, on payment of \$60,000,000. The company was now fairly in liquidation,

and on the outbreak of the mutiny of 1857 it was felt indispensable to vest the government of India directly in the crown, and this was accordingly done in 1858. Henceforth the company existed only for the purpose of receiving payment of its capital, and of the dividends due upon capital until its repayment.

**East Indies**, the name loosely applied to Hindustan, the Indo-Chinese peninsula, and a portion of the Eastern Archipelago, but excluding the Philippine Islands, New Guinea, and Australia.

**East Liverpool**, Columbiana co., O., 14 mi. n.w. of Pittsburg; has two national banks, two weekly papers, manufactories, potteries, etc. Pop. est. 1897, 11,000.

East Orange, Essex co., N. J., adjoining Newark. Railroads: Delaware, Lackawanna & Western; and Watching branch of Erie. East Orange is one of the residence suburbs of New York, 12 mi. distant. Not important as a manufacturing or business center, but has a number of pharmacal, watch-case, electrical, and other manufacturing establishments. Although a township in name, it is organized under a general charter and special laws, giving it city government under mayor and common council, and enjoys all city improvements. Pop. est. 1897, 20,000.

Easton, Tabot co., Md., near Avon River, 50 mi. s.e. of Baltimore. Railroads: D. & C. branch of the P. W. & B., and Baltimore. Chesapeake & Atlantic Ry. Industries: three flouring mills, three iron foundries, fertilizer co., and several other small factories. The town was first settled about 1550 and became a town in 1788. Pop. est. 1897, 3,500. Easton, Northampton co., Pa., on Dela-

Easton, Northampton co., Pa., on Delaware River, at the mouth of the Lehigh River. 67 mi. n. of Philadelphia. Railroads: D. L. & W.; Lehigh Valley; Cent. of N. J.; Bang & Port. Industries: flour mills, furniture factories, iron, pulp, cotton, wire, and planing mills, foundries, and blast furnaces. Lafayette College is situated here. Pop. est. 1897, 15,000.

College is situated here. Pop. est. 1897, 15,000. East River, a strait in New York, separating New York from Brooklyn, and connecting Long Island Sound with New York Bay, about 20 mi. long. A great suspension bridge crosses between New York and Brooklyn.

**East Saginaw**, a city of Mich., located on the navigable river Saginaw, about 17 mi. from its mouth in Saginaw Bay (Lake Huron), nearly opposite Saginaw. It has a large trade and important manufacturing industries.

**East St. Louis,** St. Claire co., Ill., on Mississippi River, across the river from St. Louis and connected with it by Eads's bridge. Seventeen railroads have termini here. Industries: several iron companies, three flouring mills, cotton mill, three farm-implement factories, and about twenty others of various kinds. Surrounding country agricultural and coal mining. The town was first settled in 1765 by Richard Mc Carty, and was known as the Mc Carty tract; laid out in 1815 as Jacksonville, changed to Illinoistown in 1817, incorporated in 1859, and became the city of East St. Louis in 1865. Pop. est. 1897, 30,000.

Eaton, JOHN H. (1700-1856), statesman, b. in Tennessee. He was U. S. senator from Tenn., and secretary of war under General Jackson. Later he became territorial governor of Florida, and was minister to Spain 1836-1840.

Eau Claire (5 klar), Eau Claire co., Wis., on Chippewa and Eau Claire rivers, 85 mi. from St. Paul. Railroads: Northwestern; C. M. & St. Paul; and Wisconsin Central. Industries: two flouring mills, two iron foundries, one woolen mill, and a number of other factories. Surrounding country agricultural and mineral. Eau Claire was the scene of an Indian raid in 1858, repelled by Hon. W. P. Bartlett. The town was first settled in 1855, and became a city in 1872. Pop. est. 1897, 20,000.

**Ebena'ceæ**, a natural order of exogenous plants, consisting of trees and shrubs, of which the wood is very hard, and frequently of very dark color in the center, as ebony. The leaves are alternate, and generally coriaceous and shining; calyx monosepaleous and persistent, with three or six equal divisions; corolla monopetalous, with imbricated divisions. The fruit is a globular berry containing a small number of compressed seeds.

**Eb**'ony, the popular name of various plants of different genera, agreeing in having wood of a dark color. The most valuable is the heart-wood of *D. Ebenus*, which grows in great abundance in the flat parts of Ceylon, and is of such size that logs of its heart-wood 2 ft. in diameter and from 10 to 15 ft. long are easily procured. Other varieties of valuable ebony are obtained from *D. Ebenaster* of the East Indies and *D. melanorylon* of Coromandel. Ebony is hard, heavy, and durable, and admits of a fine polish or gloss. The most usual color is black, red, or green. The best is jet black, free from veins, very heavy, astringent, and of an acrid pungent taste. On burning coals it yields an agreeable perfume, and when green it readily takes fire from its abundance of fat. It is wrought into toys, and used for mosaic and inlaid work.

Eccen'tric, a term in mechanics applied to contrivances for converting circular into reciprocating rectilinear motion, consisting of



variously shaped discs attached to a revolving shaft not in their center. An *eccentric wheel* is a wheel fixed on an axis that does not pass through the center. Its action is that of a crank of the same length as the eccentricity.

**Ecclesias' tes** ( $\cdot t\bar{e}z$ ), the title by which the Septuagint translators rendered the Hebrew *Coheleth* ("the gatherer of the people"), a symbolic name explained by the design of the book and the dramatic position occupied by Solomon in it, one of the canonical books of the Old Testament. According to Jewish tradition it was written by Solomon; but the best modern criticism has decided that its style and language, no less than its thought, belong to a much later date.

**Ecclesias' ticus**, the title of a book placed by Protestants and Jews among the apocryphal writings. The author calls himself Jesus the son of Sirach. Originally composed in Aramaic, the book was translated into Greek by the grandson of the original author about the third century B. c.

**Echeneis** (ek-e-ne'is), a genus of fishes, family Scomberidæ or mackerels, having a disc on the head by which the fish can attach itself firmly to a solid object.

Echidna (ē-kid'na), a genus of Australian toothless mammals, in size and general appearance resembling a large hedgehog, excepting that the spines are longer, and the muzzle is protracted and slender, with a small aperture at the extremity for the protraction of a long flexible tongue. The habits of the Echidna



are nocturnal; it burrows, having short strong legs with five toes, and feeds on insects, which it catches by protruding its long sticky tongue. It is nearly allied to the Ornithorhynchus, the two forming a peculiar class of animals, having in their structure some peculiarities at once of mammals, birds, and reptiles.

Echinocactus (e-kī'-) a genus of cactaceous plants inhabiting Mexico and South America, and remarkable for their peculiar forms, being globular, oblong, or cylindrical, and without leaves, fluted and ribbed, with stiff spines clustered on woolly cushions. Some of them are very bulky. The flowers are large and showy.

Echinodermata (e-kī-nō-dēr'ma-ta), a class or subkingdom of invertebrate animals characterized by having a tough integument in which lime is deposited in granules (as in the starfish and sea cucumber), or so as to form a rigid test or shell like that of the sea urchin: and by the radial arrangement of many of the parts of the adult; though this is not necessarily carried out in the digestive and reproductive systems. They are provided with an apparatus for water circulation opening into the *ambulacra* or tubular feet, which are put into use by being distended with fluid. Some of them, as the encrinites or sea lilies, are permanently fixed by a stalk when adult.

Their development is accompanied with metamorphosis, and the embryo shows a distinctly bilateral aspect, though the radiate arrangement prevails in the adult. By some they are classed with the Scolecida in the subkingdom Annuloida. The sexes are distinct.

Echinus (e-ki'nus), Sea Urchin, or Sea Egg, a genus of marine animals, the type of an order of the class Echinodermata. The body is more or less globular and covered with a test or shell, often beset with movable spines. Locomotion is affected by a singular system of ambulacra or "tube-feet," which are distended with water, protruded through pores, and again retracted. The mouth is situated on the inferior surface, generally in the center, is armed with calcareous teeth, and opens into a gullet conducting to a distinct stomach. The stomach has issue into a convoluted intestine which winds round the interior of the shell and terminates in a distinct anus. The anus varies in position, being sometimes on the apical disc and sometimes marginal.

Echo (ek'0), the repetition of a sound caused by the reflection of sound waves at some moderately even surface, as the wall of a building. The waves of sound on meeting the surface are turned back in their course according to the same laws that hold for reflection of light. In order that the echo may return to the place from which the sound proceeds the reflection must be direct, and not at an angle to the line of transmission, otherwise the echo may be heard by others but not by the transmitter of the sound. This may be effected either by a reflecting surface at right angles to the line of transmission, or by several reflecting surfaces which end in bringing the sound back to the point of issue. Sound travels about 1,125 ft. in a second; consequently, an observer stand-ing at half that distance from the reflecting object would hear the echo a second later than the sound. Such an echo would repeat as many words and syllables as could be heard in a second. As the distance decreases the echo repeats fewer syllables till it becomes mono-syllabic. The most practised ear cannot distinguish in a second more than from nine to twelve successive sounds, so that a distance of not less than 60 ft. is needed to enable a common ear to distinguish between the echo and the original sounds. At a near distance the echo only clouds the original sounds, and this often interferes with the hearing in churches and other large buildings. Woods, rocks, and mountains produce natural echoes in every variety, for which particular localities have become famous. In Greek mythology, Echo was a nymph (one of the Oreads) who fell in love with Narcissus and because he did not reciprocate her affection she pined away until nothing was left but her voice.

**Ecija** ( $\ddot{a}'$  thē- $h\ddot{a}$ ), an ancient town of Southern Spain, province of Seville, on the Genil, with manufactures of textile fabrics and a good trade. It is one of the hottest places in Spain. Pop. 24,955.

Eck, JOHANN MAYR VON (1486-1543), the celebrated opponent of Luther. He went to

Rome in 1520 and returned with a papal bull against Luther, in attempting to publish which he met with violent opposition. In 1530, while at the diet of Augsburg, he made the remarkable admission that he could confute the Augsburg Confession by the fathers but not by the Scriptures.

**Eckford**, HENRY (1775-1832), naval architect. b. in Scotland, and d. in Turkey. In 1746, he established himself as a ship builder in New York City. He was employed by the U. S. government during the War of 1812, to construct vessels-of-war for the lakes and inland waters. Mr. Eckford became U. S. naval constructor in 1820, at the Brooklyn navy yard, where, under his direction, the government built six ships of the line, of which the Okiw became the most noted. In 1831 he built a sloop-of-war for the Turkish navy, and was preparing to enter the service of that government as chief naval constructor when he died.

Eclec'tics (Greek, eklektikos, select) is a name given to all those philosophers who do not follow one system entirely, but select what they think the best parts of all systems. In this century the eclectic method found a notable supporter in the French philosopher, Victor Cousin.

Eclipse (ek-lips), an interception or obscuration of the light of the sun, moon, or other heavenly body by the intervention of another and non-luminous heavenly body. Stars and planets may suffer eclipse, but the principal eclipses are those of the sun and moon.

An Eclipse of the Moon is an obscuration of the light of the moon occasioned by an interposition of the earth between the sun and the moon; consequently, all eclipses of the moon happen at full moon; for it is only when the moon is on that side of the earth which is turned away from the sun, and directly opposite, that it can come within the earth's shadow. Further, the moon must at that time be in the same plane as the earth's shadow: that is, the plane of the celiptic in which the latter always moves. But as the moon's orbit makes an angle of more than  $5^{\circ}$  with the plane of the ecliptic, it frequently happens that though the moon is in opposition it does not come within the shadow of the earth.

come within the shadow of the earth. An Eclipse of the Sun is an occultation of the whole or part of the face of the sun occasioned by an interposition of the moon between the earth and the sun; thus all the eclipses of the sun happen at the time of the new moon. An eclipse of the sun begins on the western side of his disc and ends on the eastern: and an eclipse of the moon begins on the eastern side of her disc and ends on the western. The average number of eclipses in a year is four, two of the sun and two of the moon; and as the sun and moon are as long below the horizon of any particular place as they are above it, the average number of visible eclipses in a year is two. one of the sun and one of the moon.

Eclip'tic, the sun's path, the great circle of the celestial sphere, in which the sun appears to describe his annual course from west to east —really corresponding to the path which the

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The Greeks observed that the earth describes. eclipses of the sun and moon took place near this circle; whence they called it the ecliptic. The ecliptic has been divided into twelve equal parts, each of which contains 30°, and which are occupied by the twelve celestial signs or constellations, called signs of the zodiac, the zodiac being a belt of the heavens extending 9º on each side of the ecliptic. The plane of the ecliptic is that by which the position of the planets and the latitude and longitude of the stars are reckoned. The points at which the equator and ecliptic intersect are subject to a continual variation, receding westward at the rate of about 50 seconds a year. The angle at which the ecliptic stands to the equator is also variable, and has been diminishing for about 4,000 years at the rate of about 50 seconds in a century. Laplace showed, however, that this variation has certain fixed limits, and that after a certain time the angle will begin to increase again. The combined result of these two changes is to cause the pole of the earth not to point constantly to the same spot in the heavens, but to describe an undulating circle round a certain point; but this movement is so slow that it takes many thousand years to complete it.

Ecuador (ek-wå-dör), a republic of South America, situated under the equator (whence it takes its name) between Peru and Colombia; area 118,630 sq. mi.; pop. 1,271,860. The country is divided into a number of provinces, and falls, as regards the surface, into three sections: the comparatively narrow and lowlying coast regions, the mountain region, and the extensive plains on the east. The mountain region is formed by a double range of snow-clad mountains-several of them active volcanoes-which inclose a longitudinal valley or table-land, with a breadth of 20 to 40 mi., and varying in elevation from 8,500 to 13,900 ft. The most elevated of these mountains are, in the western range. Chimborazo, Pichincha, and Cotacachi,-Chimborazo being 20.703 ft. high. In the eastern range are Cayambe, An-tisana, and Cotopaxi (19,500). The cultivated land and the population of Ecuador lie chiefly in this elevated region, which extends along between the summits of the Cordillera, and may be considered as divided by transverse ridges or dikes into the valleys of Quito, Ham-bato, and Cuenca. The chief towns here are Quito, the capital, with a pop. of 80,000; Riobamba, and Cuenca, all situated at a height of 9,000 ft. or more above the sea. The chief ports of Ecuador are Guayaquil and Esmeraldas. The most considerable rivers, the Tigre, Napo, Pastaza, etc., belong to the basin of the Amazon: and some of them, notably the Napo, are navigable for long distances. On the west-ern slope of the Andes the chief rivers are the Esmeraldas and Guayaquil. Ecuador is comparatively poor in Mammalia; although various kinds of deer as well as tapirs and peccaries are found in the forests. Parrots and humming birds are also numerous, but perhaps the most remarkable of the birds in Ecuador is the condor, which dwells on the slopes of the

Andes. Reptiles, including serpents, are nu-The forests yield cinchona bark, merous. caoutchouc, sarsaparilla, vegetable ivory, etc. The climate on the plains, both in the east and the west, is moist, hot, and unhealthy. In the higher regions the climate is rough and cold. but in great part the elevated valleys, as that of Quito, enjoy a delightful climate. Here the chief productions are potatoes, barley, wheat, and European fruits. In the lower regions are grown all the food products of tropical climates-cacao, coffee, sugar, etc. The foreign commerce is not large, the exports and imports being annually about \$7,500,000 each. Cacao forms three-fourths (or more) of the whole export; the remainder is made up of coffee, hides, vegetable ivory, caoutchouc, etc. The mining and manufactures of Ecuador are insignificant. The people are poorly educated. The religion is exclusively Roman Catholic. The executive government is vested in a president elected for four years, who is assisted by a council of state. The congress is the legislative body, and consists of two houses, one formed of senators, two for each province, the other of deputies, one for every 30,000 inhabitants, both elected by universal suffrage. The congress has extensive privileges, and cannot be dis-solved by the president. The seat of government is at Quito. In recent years the revenue and expenditure have been about \$4,000,000 to \$4,500,000 each. The total debt amounts to The money unit is the about \$11,000,000. sucre, equivalent to 69 cents, but the coins of the U.S., France, and Britain circulate. Railways and telegraphs have made little progress. Ecuador, at the time of the conquest of Peru by the Spaniards, formed part of the great em-pire of the Incas. It was erected first into a viceroyalty of Peru, then (from 1564 to 1718) into an independent presidency. From 1718 it became part of the presidency of New Granada. In the revolutionary war against Spain Ecuador, along with the neighboring territories, secured its independence (1822), and was ultimately erected into a separate republic in 1831. Of the present population, the aborigi-nal red race form more than half; the rest are negroes, mulattoes, mestizoes, a degenerate breed of mixed negro and Indian blood, and Spanish Creoles or whites. The latter are the chief possessors of the land, but are deficient in energy.

Edda (meaning "great-grandmother"), the name given to two ancient Icelandic works, the one consisting of mythological poems, the other being mainly in prose. The first of these collections, called the Older or Poetic Edda, was compiled in the thirteenth century. The Prose Edda, or Younger Edda, presents a kind of prose synopsis of the Northern mythology; a treatise on the Scaldic poetry and versification, with rules and examples; and lastly a poem (with a commentary) in honor of Haco of Norway (d. 1263).

Eddy, CLARENCE, organist and composer, b. in 1843 at Deerfield, Ill. At the age of seventeen he was apprenticed to his father, a contractor and builder, and devoted his time to the study of architecture. He studied at Hartford, Conn., under Dudley Buck, and in Germany under August Haupt and others. On his return to the U. S. in 1875 he was made organist of the First Congregational Church of Chicago, and later held the same position in the First Presbyterian Church of that city. He has been director of the Hershey School of Musical Art since 1877. He gave concerts at the Paris International Exhibition in 1889. He has quite a reputation as an author and has published a collection. The Church and Concert Organist, and a translation, Theory of Counterpoint and Fugue by Haupt. He was made a member of the St. Cecilia Academy at Rome in 1896.

Edentata (è-) (or Toothless Animals), the name of an order of Mammalia, though only two genera of the order want teeth, the anteaters and the pangolins. The remainder are merely destitute of teeth in the front of the jaws. The teeth they possess, however, are destitute of enamel, do not have complete roots, and are not replaced by a second set. This order is also characterized by the presence of great claws surrounding the ends of the toes, and more or less approximating to the nature of hoofs. It is divided into two sections, the first comprehending the sloths, which subsist on vegetable food, and the gigantic fossil animals, Megatherium and the Megalonyx: and the second including the armadillos and the ant-eaters, which live mainly on insects, though some of the armadillos eat other sorts of animal food, and also vegetables.

Ed'gar (The Peaceable), one of the most distinguished of the Saxon kings of England, was the son of King Edmond I. He succeeded to the throne in 959, and managed the civil and military affairs of his kingdom with great vigor and success. In ecclesiastical affairs he was guided by Dunstan, and he was a great patron of the monks.

Edgar Atheiing, grandson of Edmund Ironside and son of Edward the Outlaw, was b. in Hungary. After the battle of Hastings, Edgar was proclaimed king of England by the Saxons, but made peace with William and accepted the Earldom of Oxford. Having been engaged in some conspiracy against the king he was forced to seek refuge in Scotland, where his sister Margaret became the wife of Malcolm Canmore. Edgar subsequently was reconciled with William and was allowed to live at Rouen, where a pension was assigned to him. Afterward with the sanction of William Rufus he undertook an expedition to Scotland for the purpose of displacing the usurper Donald Bane, in favor of his nephew Edgar, son of Malcolm Canmore, and in this object he succeeded. He afterward took part in Duke Robert's unsuccessful struggle with Henry I, but was allowed to spend the remainder of his life quietly in England.

**Edgewater,** N. Y., is on Staten Island, near the village of Stapleton. It has various manufactories. It is inhabited chiefly by New York business men. Pop. 14,265.

Edgeworth, MARIA (1767-1849), a celebrated

authoress. Her first novel Castle Rackrent, a tale of Irish life, published in 1801, immediately established her reputation. This was followed by a long series of novels, moral tales, popular tales, etc., among which may be mentioned Belinda, Leonora, Ennui, The Absentee, Helen, etc.

Ed inburgh, the metropolis of Scotland. It is picturesquely situated, being built on three eminences which run in a direction from east to west, and surrounded on all sides by lofty hills except on the north, where the ground slopes gently toward the Firth of Forth. The central ridge, which constituted the site of the ancient city, is terminated by the castle on the w., situated on a high rock, and by Holyrood House on the e. not far from which rise the lofty elevations of Salisbury Crags, Atthur's Seat (822 ft. high), and the Calton Hill overlooking the city. The principal street of the Old Town is that which occupies the crest of the ridge on which the latter is built, and which bears at different points the names of Canongate, High Street, Lawnmarket, and Castle Hill. This ancient and very remarkable street is upward of one mile in length. rising gradually with a regular incline from a small plain at the east end of the town, on which stands the palace of Holyrood, and terminating in the huge rock on which the castle is built, 383 ft. above sea-level. The houses are lofty and of antique appearance. Among the notable buildings are the ancient Parliament House, now the seat of the supreme courts of Scotland; St. Giles's Church, or Cathedral, an imposing edifice in the later Gothic style, recently carefully restored; the Tron Church; Victoria Hall (where the General Assembly of the Established Church meets), with a fine spire; the Bank of Scotland, etc., besides some of the old family houses of the Scottish nobility and other buildings of antiquarian interest. In the Old Town the most remarkable public building is the castle. In an apartment here is kept the ancient regalia of Scotland. No part of the present palace is older than the time of James V (1528). In the n.w. angle of the building are the apartments which were occupied by Queen Mary, nearly in the same state in which they were left by that unfortunate princess. The Advocates' Library, the largest library in Scotland, contains upward of 250,000 printed volumes and 2,000 MSS. It is one of the libraries entitled to a copy of every copyright book published in Great Britain. Besides the buildings already noticed. Edinburgh possesses a large number of important edifices and institutions, chief among which are the Royal Institution (containing accommodation for various bodies), the National Gallery of Scolland, the Museum of Science and Art, the new Episcopal Cathedral of St. Mary's, etc. Edinburgh is the headquarters of the book trade in Scotland, and the seat of the chief government departments. The origin of Edinburgh is uncertain. Its name is thought to be derived from Eadwinsburh, the Burgh of Edwin, powerful Northumbrian king, who absorbed

the Lothians in his rule. The town was made a royal burgh in the time of David I; but it was not till the fifteenth century that it became the recognized capital of Scotland. Pop. 261,261.

Edinburgh, DUKE OF, H. R. H., Prince Al-fred Ernest Albert, K. G., K. P., Duke of Saxony and Prince of Saxe-Coburg-Gotha, the second son of Queen Victoria, was b. at Windsor Castle, Aug. 6, 1844. He was educated by special tutors, and at the age of fourteen joined the steam frigate Euryalus as naval cadet, and served on various foreign stations. In 1862 he declined the offer of the throne of Greece. On his majority he received \$75,000 a year by vote from Parliament, and was created Duke of Edinburgh, Earl of Kent, and Earl of Ulster. In 1867 the duke was appointed to the command of the frigate Galatea. On Jan. 23, 1874, he married the Grand-duchess Marie, only daughter of the emperor of Russia. In 1882 he was made vice admiral, and has since held important commands.

Edison, THOMAS ALVA, inventor, b. at Milan, O., Feb. 11, 1847. His mother taught him to read, and he began work as a train boy on the Grand Trunk R. R. He learned printing and edited and printed the Grand Trunk Herald in the baggage car of the train on which he was employed. A station master whose child he had rescued taught him telegraphy. He was employed by the Western Union Telegraph Company, and there began the series of inventions which have brought him fame and fortune. As a telegraph operator he was noted for the skill and rapidity with which he transmitted messages. After brief sojourns in several Western cities he settled in Boston. Carrying on his experiments there he was able to overcome the difficulties connected with sending two messages in opposite directions at the same time, over the same wire, and invented the duplex telegraph which is highly valued, as it saves expense in the construction of lines. In 1868 he happened to be in New York when the indicator at the Gold and Stock Exchange broke down. He volunteered his services and succeeded in adjusting the instrument. He moved to New York City in 1871. His laboratories were first located at Menlo Park, N. J., and later he established headquarters at Orange, N. J. A score of skilled investigators assist him, and under his leadership invention has been reduced to an art. He has taken out nearly 400 He patents, 29 of these issued in one week. devotes himself mainly to electricity, but he has had marked success in other lines. His most valuable inventions have been patented in other countries as well as in America. Some of his most noted inventions are: the Phonograph, an instrument for making permanent records of articulate sounds; the Microphone, which detects the faintest sound; the Megaphone, by the aid of which ordinary sounds can be heard at a great distance; the *Microtasmeter*. which records minute variations in temperature. His Incandescent lamp combines purity, steadiness, safety, and simplicity, in manipulation. The *Kinetoscope*, which is one of his latest inventions is, as its name indicates, an apparently moving panorama, or machine for throwing moving pictures. Edison clearly holds the foremost position among inventors of the nineteenth century.

Ed'monton, a town in England, county of Middlesex, 74 mi. n. of London, with an extensive trade in timber, carried on by the Lea River navigation. The "Bell at Edmonton" has become famous by association with the adventures of Cowper's John Gilpin. Pop. 25,-380.

Edmund I, king of England, succeeded his brother Athelstan in 940. He conquered Cumbria, which he bestowed on Malcolm, king of Scotland, on condition of doing homage for it himself. He was slain at a banquet, 946.

Edmund II (989-1016), surnamed Ironside, king of England, was the eldest son of Ethelred II. He was chosen king in 1016, Canute having been already elected king by another party. He won several victories over Canute, but was defeated at Ashingdon, in Essex, and forced to surrender the midland and northern counties to Canute. He d. after a reign of only seven months.

**Edmunds**, GEORGE FRANKLIN, b. in Richmond, Vt., Feb. 1, 1828. He became a lawyer, and was a representative in the legislature (1854-1859), serving three years as speaker. In 1861 he was elected to the state senate, and in 1866 became U. S. senator, which offlice he has held by constant re-election to the present day. Senator Edmunds has been president *pro tem.* of the senate, and a member of many important committees. He favored the reconstruction laws, and framed a bill — known by his name — for the suppression of polygamy in Utah. He was a candidate for the presidential nominations in the Republican national conventions of 1880 and 1884.

national conventions of 1880 and 1884. **Edom**, in the New Testament *Idumaa*, in ancient times a country lying to the south of Palestine. The Edomites are said in Genesis to be the descendants of Esau, who was also called Edom (a word signifying "red"), and who dwelt in Mount Seir, the mountain range now called *Jebel Shera*, stretching between the Dead Sea and the Gulf of Akabah. The chief city in this region was Petra, which now presents remarkable ruins, rock-cut temples, etc.

Edred, king of England, son of Edward the Elder, succeeded to the throne on the murder of his brother. Edmund I, in May, 946.

Education (Lat. educo, "I lead forth") is the science of human culture and the art of training the faculties of man to their best uses and their highest results. By it the young are prepared for the proper fulfillment of the duties of civilized life. Man is the true "Wealth of Nations," and education seeks to realize all that is in man as man. It aims at securing the healthy growth and due development of all the activities of the body, mind, and will, so that each person may be able to have a fair start in life and to act well, as members of the community. under a right sense of all life's responsibilities. The teacher molds what is plastic. trains 46

what is pliant, exercises all the innate and actual powers of his pupils. As such, education presents itself in three aspects: 1, hygienic, 2, mental, and 3, moral or religious. It shows us how, 1, to nourish the child in bodily health and to cherish in it feelings of love and goodness, with a knowledge of right and duty; 2, to awaken and exercise the mind's perceptions of nature and conceptions of truth; 3, to inform the intellect and habituate it to know, admire, desire, and do what is right; 4, to enlighten and discipline the conscience, and at length incline and enable it to feel, think, and act as a responsible moral agent.

When considered as an applied science education comprises the following parts: 1, Primary or Elementary, including reading, the means of acquiring a knowledge of the thoughts of others by signs; writing, the means of communicating our thoughts to others by signs; arithmetic, the means of computing, by signs, the numbers and quantities of things; object lessons and history-by the former we are taught something of nature above, below, and around us, as well as the laws by which it is regulated; and by the latter we gain some knowledge of the race to which we belong, its doings, duties, and hopes. 2, Disciplinary or Secondary-all that improving information which goes to make a man able and wise, the gymnastics of the mind, e. g., grammar, physi-ography, mathematics, literature, classical training, health science, political and social economy, and the practical acquisition of mod-ern languages. 3, University or Liberal Studies -all that superior culture designed to make thought a pleasure and learning a refining delight. 4, Professional-those branches of knowledge which are necessary for exercising the higher vocations, e. g., of artist, author, diplomatist, journalist, lawyer, linguist, merchant, physician, preacher, statesman, scientist, teacher, etc. 5, *Technical* or Industrial, manufacturing and artistic-the special training required in agriculture, arts, commerce, engineering, and manufactures. 6, Supplementary, under which may be ranged all those studies and pursuits which are of interest to the individual and for the time, as biography, numismatics, bibliography; those gratifying to the curiosity, or the taste, as archeology, conchology, æsthetics; those calculated to bring men together sympathetically from a common bent of mind, fancy, or hobby; as well as the ordinary every-day information required in common life. such as is stored up in almanacs, classified in handbooks, and met with in newspapers.

À somewhat more scientific or theoretical outline of education or systematic pedagogy arranges its matter into these groups: 1, *Physical*—that which makes and keeps the body healthy; trains it to usefulness, pliancy, and elegance; and induces, by gymnastic drill and athletic exercises, skill of muscle and nerve, acuteness of sense, and handy readiness of frame. 2. *Instrumental*—(a) elementary, as reading, writing, and arithmetic; (b) technical, as drawing, a knowledge of the use and manipu-

### Education

lation of objects, products, machinery, etc.; (c) mental: words and their uses, composition, bookkeeping, etc.; (d) professional: the arts and duties of business, office, factory, workshop. warehouse, field, or shipboard. 3, Informing, as grammar, geography, history (civil and natural), government, taxation, finance, the progress of events, and an acquaintance with topics of every-day interest and necessity. 4. Culturing, as logic, rhetoric, mathematics, science (physical and social), philosophy (ethical, mental, and political), statistics, language, and literature (ancient and modern), criticism, etc. 5, Moral, i. e., relating to duty (personal, family, civil, social, or legal). 6, Political, concerning the rights and responsibilities of citizenship in private, public, or official life. 7, Philosophical, in regard to (a) the theory of life. thought. and action, and the legislation founded on it; (b)scientific ethics and sociology, the history of systems of thought on man, life, and society. 8, Æsthetic, (a) the knowledge, practise, and enjoyment of the fine arts; (b) the perception of the sublime and the beautiful, and the delight derived from natural scenery; (c) the nature, uses, and pleasures of poetry and imaginative literature. 9, Religious, dealing with (a) personal piety; ( $\delta$ ) public worship, and the rights and duties of fellow worshipers; (r) the special duties of members, adherents, and officials in relation to their own and other creeds; (d) social efforts and home influence, etc.;  $(\epsilon)$ missionary enterprise (home and foreign); (f)individual example, state regulations, and church arrangements; (g) public worship or national recognition of God. A theory of education may also be presented to the mind in (a)its nature, (b) its form, and (c) its limits; in its particular elements, as (a) physical, (b) practi-cal, and moral, and (c) intellectual; and in its special systems, as (a) theocratic, (b) national, or (c) humanitarian. These are next found dealing with (a) personal culture, (b) special callings, (c) the duties of home and citizenship.

History .- The history of education leads us to trace the means employed in the training of children under patriarchal rule, as in the earlier races of the earth; in the family circle, as in China; in tribes, as among many savage people; in castes, as in India and other Oriental lands; for military purposes mainly, as in Persia, or for priestly ones, as in Egypt and among the Celtic Druids. It was pursued in ancient Greece with a philosophical design, and in Rome with a practical one. In mediaeval Europe and in modern Thibet an ecclesiastical bent prevailed; in America, Germany, and France a political intent to a large extent regu-lates it. It has not been pursued in the past with the single object of making the best of a man for himself, and doing the best with him in society - as the culture of life. Hence we require to trace its course through slight indications of facts brought together and arranged by a few theoretical links. In the primitive forms of life the chief lessons of the young would be to obey at home, to help with the flocks or toil in the fields, and to refrain from offenses against parents, friends, and neigh-

bors. So long as pastoral and agricultural occupations prevailed, this or little more sufficed. In the dawn of civilization only the priests and their assistants required mental training and moral culture. Hieroglyphics wrapped up their professional secrets for cure of body and for care of soul. Among the Jews the schools of the prophets were training colleges for the brighter minds among the people of Palestine.

After Solomon had wisely advised the Israelites "to train up a child in the way he should go," some mode of education seems to have been adopted. The Greeks looked on strength of sinew and beauty of body as of vast importance. A highly educated priesthood existed both in Greece and Rome. Learning, however, was not confined to that class. The love of wisdom, philosophy, was the leading mark of the Hellenic race. Their zeal for culmark of the Hellenic race. ture called forth a class of teachers, the sophists, who popularized the knowledge and fashioned the opinions of their ages. Socrates taught men to exercise their minds for the discovery of truth. Athens became the university of Rome. Schools existed in Italy for instruction in reading, writing and arithmetic; but Greek was the language of culture. Ability and pliability formed, in their ideal, a complete man; and hence they advocated dexterity in the elementary subjects, readiness in speech, and knowledge of myths, legends, poetry, and history. The pedagogue regulated life and manners; the schoolmaster inculcated instruction and exercised the mind; the father gov-In this Rome erned the character and will. imitated Greece.

The Christian church received from its founder the command to "teach all nations." In this lay the germ of popular education. All the great schools and communities of scholars were connected with the church and its mis-During the Middle Ages the clergy and ity were clearly distinguished. The sions. the laity were clearly distinguished. monks were taught that and what they might teach; grammar, logic, and rhetoric, music, arithmetic, geometry, and astronomy. The knight was taught to ride, fence, shoot, swim, box, hawk, play chess, and sing love songs to his lute and his lady. The toiling masses tilled the soil and wrought at handicrafts. The merchant classes established guilds. Charlemagne, desiring to rule over an enlightened people, set schools afoot in the chief cities of his empire. He enjoined the bishops to see that the children in their dioceses were learned in grammar, arithmetic, music, and gospel truth. Greek poetry was committed to memory, and astrology was a favorite pursuit. The institution of universities and the cultivation of modern tongues: the culture in writing, the multiplication of books, the study of the Roman law, and the need which thus arose for a renewed examination of the Latin language, excited the minds of men and increased the number of those who sought knowledge. Learning revived.

When printing made books readily accessible schools increased rapidly. Scholars like Erasmus passed from land to land, carrying the

torch of knowledge as they went. Luther's appeal from pope to people carried the need of learning into the cottage. In most other lands education was dealt with mainly as a minor branch of religion and an outlet for benevolence. Schools were mostly benefactions or church pertinents. Montaigne insisted that "we have not to train a soul, nor yet a body only, but a man," and he objected to giving children "a smattering of everything in general, but nothing to the purpose in particular.' The practical systems of instruction pursued by Valentine Trotzendorf of Goldberg and John Sturm of Strasburg became the models on which the grammar or classical schools of Germany were formed. Wolfgang von Ratich proposed an improved school system to the German diet (1612). J. A. Comenius, an Austro-Slav and a Moravian brother, devoted his life to improving the instruction and discipline of schools, and making man through them surely, easily, and solidly wise and holy. He is the chief of modern didactic educationists. Milton, through Hartlib, had been led to study Comenius, and to compose his Tractate on Edu-The Commonwealth Parliament entercation. tained the idea of endowing a universal college for "the advancement of learning" on Bacon's ideal. Then the times changed and enthusi-asm waned. John Locke's *Thoughts on Edu-*cation (1690), though discursive and irregular. advocates the careful development both of body and mind in manliness, wisdom, and virtue. Defoe, about 1692, in an Essay on Projects protested against making women "only stewards of our houses, cooks, and slaves;" and said, "The soul is placed in the body like a rough diamond, and must be polished or the luster of it will never appear. And it is manifest that as the rational soul distinguishes us from brutes, so education carries on the distinction, and makes some less brutish than others.' A century and a quarter elapsed before these thoughts ripened into legislation in England.

Meanwhile Emile, a romance of education, by J. J. Rousseau, which maintained that man should have a strong, serviceable body, welltrained muscles and nerves, and ought not to be required to obey, but be led by comradeship. grew into encyclopedism and the Revolution in France, and roused men to consider anew the nature and need of education. Kant philosophized on paideutics; Goethe in Wilhelm Meister supplied his ideal of training a living mind for living its life aright; Fitche explained "the vocation of man" and of "the scholar to be "duty, intelligence, and effectiveness." Pestalozzi, stirred by Emile, proclaiming that vice and misery arose from ignorance, entered on a crusade against their cause. He moved Europe to undertake in some fashion the cultivation of souls as well as soils, and education became the enthusiasm of the age. Froebel founded the kindergarten. The worth of man as an article of culture, and of education as a national industry, gained public attention.

United States.—In the early national legislative recognition of education America holds a

distinguished place. Here universal suffrage and universal education condition each other, and the culture of humanity is brought within the sphere of the state. One of the earliest Education Acts of the original colonists of Massachusetts Bay, incorporated in 1628, was passed in 1632. It required householders to give "their children and apprentices as much learning as would make them able to read perfectly the English tongue, and know the capital laws," which they were bound to obey. A law making the support of schools compulsory and education free and universal was enacted in 1647. This was confirmed in 1692, reaffirmed in 1780, and expressly made a state law in 1789. An appropriation either in taxes or in land, is set aside in each school district for the proper and adequate provision of instruction in each township, and since 1835 a permanent fund for the support and encouragement of education has been established. The management of this fund was by the legislature entrusted to a board of education This has formed the model on in 1837. which the Atlantic, the Central, the Western, the Pacific Coast, and the Southern states, have all, though at more recent dates and with several slight differences, molded their school system. The plan is so elastic and expansive, in regard to course of studies and thoroughness of instruction, that it may be utilized in all places and adapted to all wants. The state demands that suitable schools shall exist and be maintained in a given population. It leaves the nature of the school buildings, the choice of teachers, the supply of books, and the oversight of the instruction in the hands of the local committee; and though it decrees that children must be taught, it leaves the enforcement of the law mainly with the local administrators. In most cases the schooling is free, the Bible is read, but doctrines are not taught. The teachers are examined and certificated, generally by local boards. Normal training schools were instituted in Boston in 1839, and have multiplied greatly. Schools are usually open to boys and girls. The classing of schools has been found difficult, a closer community of interest among teachers and between teachers and their employers being required; and greater uniformity of administration has been aimed at, since the Civil War has made the Union more compact, and the benefit of education more felt and better appreciated. The American statistics of education are very complete, and the reports of the bureau of education highly valuable.

Europe.—Among the states of Europe, Prussia long enjoyed the highest reputation for the excellence of its provisions for the education of the people. Educational enactments prevail in Denmark, Switzerland, and the minor members of the German States' Confederation. Though in Austria and Hungary education has since 1849 been placed in charge of a minister of public worship and instruction, there are some peculiarities in which it differs from the German-speaking states. Boarding and technical schools are more numerous. Nearly

### Education

the whole expense of instruction is provided for from general and local taxation, and is, through all grades, in the main gratuitous Education is almost entirely under the management of the clergy, especially the Jesuits. France owes to a voluntary association, founded in 1815, the initiation of the present national system of popular education. It was organ-ized as "a Society of Public Utility" in 1831. In the Netherlands each district must have at least one elementary school, supported by the local public funds. All teachers undergo examination before being permitted to teach, and all schools are under government inspection. Religious instruction is excluded from public schools, whether elementary or higher. Education in Russia has not yet been thoroughly nationalized. Village schools are upheld mainly by voluntary funds; the gymnasia in the provincial towns are in some cases endowed, in others supported from the imperial treasury. Poor students are allowed maintenance at these and at the universities. There is a minister of education, and many improvements in the diffusion, organization, and teaching of schools followed the abolition of serfdom. Since the union of the Italian peninsula into a kingdom great efforts have been made to increase elementary schools and to provide for adequate instruction in them. Normal schools have been established, and as teachers are prepared they are speedily placed out in the new public and endowed schools.

A social and political revolution in Japan, in 1868, led to the recognition of the importance of education. The new government estab-lished a bureau of education, introduced a number of teachers, and sent into different countries a select number of youths to be trained intellectually and technically. A large number of these, besides several English and American teachers, have been put in charge of schools. English is taught. America has been chosen as the model of their free schools and colleges. It took England a long time to exchange the idea that education is a charity to that of its being a right, a duty, and a safeguard, but it came to that at length. Eton was established by Henry VI in 1441; Westminster, prior to the time of Edward the Confessor, but as it now exists, by Queen Elizabeth. 1561; Charter-House, by Thomas Sutton, 1611: Rugby, by Lawrence Sheriff, 1567. These are endowed seminaries, in which are combined the characteristics of a boarding house and a school. Prior to the Reformation almost all schools were controlled by and in connection with the church, and most of them were grammar schools. From the Reformation until the present century endowed grammar schools supplied a liberal education to those who received their training in them. Early in the present century, Owen, Bentham, Brougham, Horner, James Mill, etc., advocated national education. When the Revolution and the Pestalozzi fervor excited men, various means were adopted to increase the quantity and improve the quality of instruction. The National Society for promoting the education of the



poor in the principles of the established church was founded in 1811. The compulsory educationists started a league at Birmingham, and the denominationalists a union at Manchester in 1869. The Society of Arts brought the chiefs of these bodies together at a conference in 1870. Public educational acts regulate: 1, the constitution, duties, and proceedings of school boards; 2, the appointment of officers and managers by the school boards; 3, the payment and remission of fees; 4, the purchase of sites; 5, the use of compulsory measures to secure attendance; and 6, fixes the tenure of the teacher at the discretion of the board, and arranges for his removal when necessary.

Education flourished in Ireland during the Middle Ages. The Celtic monasteries were centers of light. Their members devoted themselves to prayer, study, and the tran-scription of MSS. or the compilation of books. Missionary zeal excited eagerness for knowledge. Not only did the monks carry learning abroad, as St. Columban did; but scholars from every land and English students of all classes found hospitable welcome, food, books, and instruction in the schools of the saints. A training college for teachers of higher class schools has been established at Finsbury, and the education department now requires from all its certified teachers some knowledge of the history, theory, and practise of education. The Education Society, for examining and expounding the principles of education, was founded in 1875. The Teachers' Guild of Great Britain and Ireland has been founded (1884) to facilitate a closer co-operation among teachers, and with those who are educated in educational effort and progress.

Edward I, known as the Elder (870-925), king of England, son of Alfred the Great. succeeded his father in 901. His reign was distinguished by successes over the Danes. He fortified many inland towns, acquired dominion over Northumbria and East Anglia, and subdued several of the Welsh tribes.

Edward II, surnamed the Martyr (960-979), king of England, succeeded his father. Edgar, at the age of fifteen, in 975. His reign of four years was chiefly distinguished by ecclesistical disputes.

Edward III, king of England, surnamed the Confusior, younger son of Ethelred II. On the death of his maternal brother, Hardicanute the Dane, in 1041, he was called to the throne, and thus renewed the Saxon line. Edward was a weak and superstitious, but wellintentioned prince, who acquired the love of his subjects by his monkish sanctity and care in the administration of justice. His queen was the daughter of Godwin, earl of Kent. He died in 1066, and was succeeded by Harold, the son of Godwin.

Edward, Prince of Wales (1330-1376), surnamed the *Bluck Prince*, the eldest son of Edward III and Philippa of Hainault. In 1346 he commanded part of the forces at the battle of Crécy, and earned the praise of his warlike father. In 1355 he commanded the army which

invaded France from Gascony, and distinguished himself the following year at the great battle of Poictiers. By the Peace of Brétigny the provinces of Poictou, Staintonge, Périgord, Limousin, were annexed to Guienne and formed into a sovereignty for the prince under the title of the Principality of Acquitaine. A campaign in Castile, on behalf of Pedro the Cruel, and the heavy taxes laid on Acquitaine to meet the expenses, caused a rebellion, and ultimately involved him in a war with the French king. His own health did not allow him to take the field, and having seen his generals defeated he withdrew into England, and after lingering some time died, leaving an only son, afterward Richard II.

Edward I (1239-1307), king of England, son of Henry III, was born at Winchester. The contests between his father and the barons called him early into active life, and he finally quelled all resistance to the royal authority by the decisive defeat of Leicester at the battle of Evesham, in 1265. During his reign great progress was made in the establishment of law and order throughout the land.

**Edward II** (1284-1327), king of England, b. at Caernarvon Castle, and the first English Prince of Wales, succeeded his father, Edward I, in 1307.

Edward III (1313-1377), king of England, son of Edward II, by Isabella of France. On his father's deposition in 1327 he was proclaimed king under council of regency, while his mother's paramour, Mortimer, really possessed the principal power in the state.

sessed the principal power in the state. Edward IV (1441-1483), king of England. His father, Richard, duke of York, was grandson of Edward, earl of Cambridge, and duke of York, fourth son of Edward III, while the rival line of Lancaster descended from John of Gaunt, the third son. The York line had intermatried with the female descendants of Lionel, the second son, which gave it the preferable right to the crown. Edward, on the defeat and death of his father at the battle of Wakefield, assumed his title, and having entered London after his splendid victory over the troops of Henry VI and Queen Margaret at Mortimer's Cross. in February, 1461, was declared king by acclamation. Edward V, king of England (1470-1483), the

Edward V, king of England (1470-1483), the eldest son of Edward IV, was in his thirteenth year when he succeeded his father in 1483. He fell into the hands of his uncle, the duke of Gloucester, who made himself king as Richard III and caused the young king and his brother to be sent to the Tower, where it is said, he had them smothered by ruffians.

Edward VI (1537-1553), king of England, son of Henry VIII, by Jane Seymour. At his father's death he was only ten years of age. His education was intrusted to men of the first character for learning, under whose training he made great progress and grew up with a rooted zeal for the doctrines of the Reformation. His reign was, on the whole, tumultuous and unsettled.

Edwards, AMELIA BLANDFORD (1831-1892), an English novelist. As far back as 1853 she began to contribute to periodicals. Among her best-known novels are Hand and Glove; Half a Million of Money; Lord Brackenbury.

Edwards, JONATHAN (1703-1758), a celebrated theologian and metaphysician, h. at East Windsor, Conn. He entered Yale College in 1716, and studied till 1720, in 1722 received a license as preacher. In 1723 he was elected a tutor in Yale College, but resigned in 1726 to be ordained as minister at Northampton, Mass. After more than 23 years of zealous service here he was dismissed by the congregation owing to the severity with which he sought to exercise church discipline. He then went as a missionary among the Indians at Stockbridge, in Massachusetts. Here he composed his famous work on the *Freedom of the Will*, a masterpiece of metaphysical argument. It appeared in 1754, and was completed within four months and a half. In 1758 he was chosen president of the college at Princeton, New Jersey, but d. shortly afterward.

d. shortly afterward. Edwy, king of England, son of Edmund I, succeeded his uncle Edred in 955. Taking part with the secular clergy against the monks, he incurred the confirmed enmity of the latter. The papal party, headed by Dunstan, was strong enough to excite a rebellion, by which Edwy was driven from the throne to make way for his brother Edgar.

**Eel**, the general name of a family of teleostean fishes belonging to the apodal section of the Malacopterygii. They belong to various



The Common Eel.

genera. The genus Anguilla is characterized by its scrpent-like elongated body, by the absence of ventral fins, and the continuity of the dorsal and anal fins round the extremity of the tail. The dorsal fin commences half-way between the head and the anal fin, and the lower jaw projects beyond the upper. In the genus *Conger*, which is exclusively marine, the dorsal fin commences above the pectoral, and the upper jaw is the longer. The smoothness of the body—the scales being inconspicuous—and the serpentine movements of eels are proverbial. The conger and at least three other species the sharp-nosed, the broad-nosed, and the snig-belong to Britain. The species of the sharp-nosed genus, which are both fresh-water and marine, seldom exceed 30 in. in length. Eels avoid cold, and frequently migrate in winter to the mud or brackish water of estuaries where the temperature is higher. They have even been met with in large numbers performing migrations on land, mostly intervening necks of soil covered with damp grass. Some eels spawn in the estuaries of rivers, and immense numbers of the young eels pass up the streams in spring, their passage in England being called the *eel-fare*. Eels are considered excellent food.

Effingham, Effingham co., 111., 100 mi. e. of St. Louis. Railroads: Vandalia Line; Illinois Central; Wabash; and Indiana & Illinois Southern. Industries: two large flouring mills. Surrounding country agricultural. The town was first settled about 1845. Pop. est. 1897, 4,500.

Egbert, considered the first king of all England, was of the royal family of Wessex. He succeeded Brihtric in 802 as king of Wessex. He reduced the other kingdoms and rendered them dependent on him in 829, thus becoming their overlord. He d. in 839.

Ege'ria, a nymph who received divine honors among the Romans. Numa is said to have received from her the laws which he gave to the Romans.

Egg, a body specially developed in the females of animals, and in which, by impregna-tion, the development of the young animal takes place. Birds, reptiles, fishes, insects. and worms are oviparous, i.e., bring forth eggs or ova, as do also, among mammalia, the or-nithorhynchus and echidna. The egg contains the germ of the young animal, as well as the substance which serves for its nourishment. All it needs for its development is external The eggs of animals lower than the heat. birds have usually only three parts, viz., the germinal spot or dot, the germinal vesicle, and the vitellus or yolk; the first being contained in the vesicle, and that again in the yolk. Besides these parts the eggs of birds have the white or albumen, and the shell, which consists of a membrane coated with carbonate of lime. The eggs of birds, especially of fowls, are a pleasant and nutritive food. The common domestic fowl, the turkey, the pea-hen, and the common duck produce the eggs which are commonest in the market. Among reptiles, turtles produce eggs which are good for eating. The eggs of fishes are their roe or spawn. A hen's egg of good size weighs about 1,000 grains, of which the white constitutes 600, the yolk 300, and the shell 100. When the white of an egg is warmed it coagulates to a firm opaque mass. Eggs form an important article in American commerce.

**Egg-bird**, a species of tern, a bird of considerable commercial importance in the West Indies. as its eggs, in common with those of two other species of tern, form an object of profitable adventure to the crews of numerous small vessels.

Eggleston, EDWARD, b. in Vevay, Ind., Dec.

### Eggleston

10, 1837. His education consisted of a knowledge of Latin and some Greek, and an extensive acquaintance with the French language and literature, also Spanish and Italian. When nineteen years old he joined the Methodist ministry and preached for ten years. His literary career began in 1860, as editor of the *Little Corporal*, at Evanston, Ill. In 1870 he



Egg-Bird.

became literary editor of the Independent, in New York City. As he said, the purpose of his novels was to do "something toward describing life in the back country districts of the Western states." His principal novels are, The Hoosier Schoolmaster, The End of the World, Rory, and The Faith Doctor; in history, Household History of the U. S., Eighty Famous American Indians, etc.

**Eggleston**, GEORGE CARY, brother of Edward Eggleston, b. in Vevay, Ind., 1839. He was educated at Indiana Asbury University and Richmond College, Va. Later he practised law in Virginia and was a Confederate soldier throughout the Civil War. Later he became editor-in-chief of *Hearth and Home*, and in 1875, literary editor of the *Evening Post*. In 1889 he became editorial writer of the World. Among the books which he has published are, A Rebel's Recollections; The Wreck of the Red Bird; and The Juggernaut.

**Eggplant**, natural order Solanaceæ, an herbaceous plant, from 1 ft. to 18 in. high, with large white or purplish flowers. The fruit is about the size of a goose's egg, and generally yellow, white, or violet, and when boiled or stewed is used as an article of food. It is cultivated in India, the U. S., etc., and in European hothouses.

Eg'lantine, one of the names of the sweetbrier, a kind of wild rose. The name has sometimes been erroneously used for other species of the rose and for the honeysuckle.

Egmont, LAMORAL, COUNT (1522-1568), a famous Dutch patriot. He entered the military service, accompanied Charles V in his African expeditions, and distinguished himself under Philip II in the battles of St. Quentin and Gravelines. Egmont became involved in the political and religious disputes which arose between the Netherlands and their Spanish rulers. He tried to adjust the difficulties between both parties, and in 1565 went to Spain to arrange matters with Philip. In 1567 the Duke of Alva was sent with an army to the Netherlands to reduce the insurgents. One of his first measures was to seize Count Egmont and Count Horn. After a trial before a tribunal instituted by Alva himself they were executed at Brussels. E'goism, as a philosophical doctrine, the

**E'goism,** as a philosophical doctrine, the view that the elements of all knowledge and the reality of the things known are dependent on the personal existence of the knower. Hence the logical position of the egoist is to doubt the substantial reality of everything except his own existence.

**E'gret**, a name given to those species of white herons which have the feathers of the lower part of the back elongated and their webs disunited, reaching to the tail or beyond it at certain seasons of the year. Their forms are more graceful than those of common herons. The American egret is about 37 in. long to the end of the tail; plumage soft and blended; head not crested; wings moderate; the tail short, of 12 weak feathers.

Egypt (ë'jipt), a country in the northeastern part of Africa, governed by a ruler (the khedive, or viceroy) who pays tribute to the sultan of Turkey, but is virtually independent. Egypt is bounded on the n. by the Mediterranean Sea, on the e. by Arabia and the Red Sea, and on the w. by the Libyan Desert. Its natural southern frontier may be placed about Assouan (about 500 mi. s. of the Mediterranean), near which cultivated land almost disappears and the country begins to assume the features of the Nubian Desert. Egyptian troops, however, still hold the country as far as the Second Cataract of the Nile at Wady Halfa (about 670 mi. s. of the Mediterranean), which is the limit of free navigation for larger vessels. The authority of the khedive extended till recently over the countries on the Upper Nile up to a few degrees from the equator, including Kordofan, Darfur, Bar-el-Ghasal, etc.; but this territory acquired by conquest and known by the general name of the Soudan, has been evacuated owing to the rebellion of the people against Egyptian authority. On the Red Sea littoral the farthest point s. under the Egyptian flag is Suakin. A small strip of n.w. Arabia on the e. of the Red Sea belongs to Egypt, as also the Sinaitic peninsula and the Isthmus of Suez. Area 394,000 sq. mi.; pop. 6,817,265. The capital and largest town is Cairo, the next largest and chief seaport is Alexandria.

The inhabited portion of Egypt is mainly confined to the valley of the Nile, which, where widest (at the Delta), does not exceed 80 mi, and narrows steadily as we ascend its stream till, at the southern frontier, it is only 2 mi. wide. The Nile has no tides, but runs constantly toward the sea at the rate of 21 to 3 mi. an hour. After it enters Egypt it flows in a northward direction but with considerable bends till it reaches a little beyond Cairo, where it divides into two main streams, the Rosetta and Damietta branches, which enclose that portion of land known as the Delta and formed by deposits of alluvial matter. Bordering on the Mediterranean are several salt lakes or lagoons, Menzaleh being the largest, through which is carried the Suez Canal, connecting the Mediterranean and the Red Sea; and also passing through other salt lakes; about 150 mi. s. of the Mediterranean is the lake Birketel-Kurun, fed by the Nile. As very little rain falls in Egypt, the prosperity of the country entirely depends upon the Nile, and especially upon the yearly overflow of the river, which so fertilizes the soil with a brown slimy deposit that it produces two crops a year. Beyond the limits of the inundation and of irrigation there is no cultivation whatsoever. The Nile begins to rise in June, and continues to increase until September, overflowing the low lands along its course, the waters being conveyed by canals where natural channels fail. The Delta then looks like an immense marsh interspersed with islands, villages, towns, and plantations, just above the level of the water. After a few days the water begins to subside, and leaves the land again dry about the end of October. The seed is then sown, and artificial irrigation is maintained by water raised from the river, and distributed by means of chan-nels throughout the fields. The appliances for raising water are simple and primitive; chiefly the shadoof worked by two men, and the sakieh driven by a donkey or an ox. The land is soon covered with green crops, and the first harvest is in March.

At Cairo the valley of the Nile becomes well defined. It is bordered on the east by what are called the Arabian hills, and on the west by the Libyan ranges. Beyond the limits of the valley on the Libyan side are five oases at intervals-those of Khårgeh, Dåkhel, Faråfra, Sîwa, and Bahrîyeh-islands of verdure and cultivation, in some of which artesian wells The great oasis Wah-elare numerous. Khårgeh extends south for 100 mi. These oases are also dependent on the Nile like the rest of habitable Egypt, for the water to which they owe their existence is partly derived from the subterraneous percolation from that river. The territory to the east of the Nile is mainly a bare rocky region, mountainous toward the coast, maintaining a small nomadic population. The broad plains of the Delta and the comparatively narrow valley of the river higher up, make two natural divisions of Egypt, upper and lower. These wer-ciently regarded as separate kingdoms. These were an-The lower part of the valley, however, which includes the fertile tract adjoining Lake Birketel-Kurun, known as the Fayoum, differs so much from the higher part as to give rise to the division into Lower, Middle, and Upper Egypt. The country is now divided into governorates and mudiriehs.

The atmosphere in Egypt is extremely clear and dry, the temperature regular and exceedingly hot. The winter months are the most delightful part of the year; later, the ground becomes parched and dry, and in May the suffocating khamseen, or simoom, begins to blow from the desert plains. Rain is scanty except near the seashore: but at night the dews are heavy in Lower Egypt, and the air cool and refreshing. Egypt is not remarkably healthy, as, in addition to visitations of plague and cholera, ophthalmia, diarrhœa, dysentery, and boils are very prevalent.

The rock formations of Egypt consist largely of nummulite limestone, especially at the Nile and in the Libyan Desert, and of granite, sycnite, porphyry, and other crystalline rocks in the Arabian Desert (between the Nile and Red Sea), with sandstone in the south. Over a great extent of Egypt the rocks are covered with shifting sands, and in the lands bordering on the Nile by the alluvium deposited during the inundations, and which consists of an argillaceous earth or loam, more or less mixed with sand. Among the useful minerals found in the country are granite, syenite, basalt, porphyty, limestone, alabaster, natron, bitumen, salt, and sulphur.

Now as formerly there is little timber, the principal trees, besides the date palm and tamarisk, being the sycamore fig, and acacia or gum-arabic tree, which last does not attain to any size n. of Wady Halfa. The papyrus plant, once so important, is now to be found only in one or two spots. Of it was manufactured a paper which was supplied to all the ancient world. Besides the lotus or water-lily of the Nile, Egypt has always been celebrated for its production of corn, barley, a great variety of the bean class, leeks, garlic, onions, flax, and for plants of the cucumber tribe. To the products of ancient times have been added the sugar cane, cotton plant, indigo, and tobacco.

Egyptian oxen were celebrated in the ancient world. The camel was early introduced: horses and asses have always abounded; sheep and goats are numerous; the cat is universal as a domestic animal. Wild animals include the hyena, jackal, fox, lynx, genet, ichneumon. jerboa, wild goat, gazelle and one or two other antelopes, hare, etc. The crocodile formerly reached the Delta, but is now seldom seen below Assouan. Water fowl are plentiful; so are vultures and other birds of prey. The sacred ibis is still found in the south, and the pelican in the northern lagoons. Among the countless insects are the sacred beetle, the locust, and mosquito.

In spite of the fact that at least two and sometimes three successive crops may be gathered in a year, agriculture in Egypt is still in a very low state; and the extreme poverty and generally wretched condition of the cultivators render improvement difficult. There are few trades which have attained a development of any importance. The tanning and potterymaking, however, deserve praise; coarse cotton cloths are made; silk is cultivated; and the sugar cane is grown to a considerable extent. The commerce of Egypt is considerable, and has greatly increased since the construction of the Suez Canal and the railways. The railways have a length of about 1,200 mi. The total value of exports amounts to \$65,750,000, that of imports to \$56,000,000.

Of the inhabitants of Egypt those of the peasant class, or Fellahs as they are called, appear to be descendants of the ancient

Egyptians mixed with Arab blood. Having embraced Mohammedanism, they are often denominated Arabs, though regarded by the true Arab with contempt. The Copts are the descendants of the ancient Egyptians who embraced and still cling to the Christian religion. Though comparatively few in number, their education and useful talents enable them to hold a respectable position in society, as clerks, accountants, etc. With those aboriginal inhabitants are mingled, in various proportions, Turks, Arabs (chiefly Bedouins), Armenians, Berbers, negroes, and a considerable number of Europeans, especially Greeks and Levantines.

The government of Egypt is in the hands of the khedive, or viceroy, who is assisted by a ministry formed on the model of those of Western Europe. The title and government are hereditary, but the khedive, as a Turkish vassal, has to pay an annual tribute to the sultan of \$3,500,000. For some years previous to 1882 two controllers general, appointed respectively by France and Britain, had extensive powers of control in the administration of the country; but in that year the French having refused to lend assistance in putting down the rebellion of Arabi Pasha, a British army occupied Egypt, and the government has since been carried on under the supervision of Britain, various reforms having been introduced. Egypt is much burdened by the public debt, which amounts to the sum of \$517,278,200.

History .- The Egyptians are the earliest people known to us as a nation. When Abraham entered the Delta from Canaan they had long been enjoying the advantages of a settled government. They had built cities, invented hieroglyphic signs, and improved them into syllabic writing, and almost into an alphabet. They had invented records, and wrote their kings' names and actions on the massive tem-ples which they raised. The arrangement of Egyptian chronology is still a much disputed point among scholars. A list of the kings of Egypt, arranged in 30 dynasties, was given by the priest Manetho (about 250 B. C.), and this division is still used. The Fourth Dynasty is distinguished as the "Pyramid Dynasty." Three of its kings, Khufa, Khafra, and Menkaura (according to Herodotus, Cheops, Chephren, and Mykerinos), built the largest pyramids. The date assigned to these kings in the chronology of Lepsius is 2800-2700. About 2100 Egypt was conquered by the Hyksos, or shep-herd kings, who invaded Egypt from the east and established their capital at Tanis (Zoan). The Theban princes seem, however, to have preserved a state of semi-independence, and at last a revolt commenced which ended by the shepherd kings being completely driven out of Egypt by King Aahmes (Amäsis) of Thebes (about 1600), the first of the Eighteenth Dy-nasty. With Aahmes and the expulsion of the shepherd kings began the reigns of those great Theban kings who built the magnificent temples and palaces at Thebes. The Ramessides form the Nineteenth Dynasty. They com-mence with Rameses I, who seems to have been

of Lower Egyptian extraction. His grandson, the great Rameses II, or Sesostris, was successful against the neighboring Arabs, and covered Egypt with magnificent buildings. Rameses II was probably the Pharaoh who oppressed the Hebrews, and the exodus may have occurred under his successor Meneptah, or Merenptah. Under the later Ramessides the Egyptian Empire began to decay. A new dynasty (Twentyfirst) came to the throne with King Hirhor. He attempted to restore Egyptian rule to the East, and conquered and plundered Jerusalem. After his death Egypt was torn by civil wars, and eventually the Ethiopians, under Shabak (Shabako), conquered it. Uahbra (the Greek Apries, the Hophrah of the Bible) and Aahmes II followed. About 532 Cambyses, king of About 532 Cambyses, king of Persia, overran Egypt and made it a Persian province. During the reign of Cambyses the Egyptians suffered much oppression. After the Persian defeat at Marathon the Egyptians rose and recovered their independence for a short time, but were again subdued, and, in spite of two other revolts, Egypt remained a Persian province till Persia itself was conquered by Alexander the Great, B. c. 332.

Egypt now became a Greek state, many Greeks having been already settled in the country, and the Egyptians were treated as an inferior race. Alexandria was founded an inferior race. as the new Greek capital. On Alexander's death his general, Ptolemy, took possession of the throne and became the first of a Greek dynasty that for three hundred years made Egypt one of the chief kingdoms of the world. The Ptolemies were magnificent patrons of letters and arts. Theocritus, Callimachus, Euclid the geometrician, the astronomers Eratosthenes and Aratus, etc., flourished under their rule. But while the Alexandrian Greeks managed to keep down the native Egyptians, they were themselves sinking under the Romans. Ptolemy Auletes went to Rome to ask help against his subjects, and the famous Cleopatra maintained her power only through her personal influ-ence with Julius Cæsar and Mark Antony. On the defeat of Mark Antony by Augustus B. C. 30, Egypt became a province of Rome. It was still a Greek state, and Alexandria was the chief seat of Greek learning and science. On the spread of Christianity the old Egyptian doctrines lost their sway. Now arose in Alexandria the Christian catechetical school which The sects produced Clemens and Origen. of Gnostics united astrology and magic with religion. The school of Alexandrian Platonics produced Plotinus and Proclus. Monasteries were built all over Egypt; Christian monks took the place of the pagan hermits, and the Bible was translated into Coptic.

On the division of the great Roman Empire (A. D. 337), in the time of Theodosius, into the Western and Eastern Empires, Egypt became a province of the latter, and sank deeper and deeper into barbarism and weakness. It was conquered 640 A. D. by the Saracens under Caliph Omar. As a province of the caliphs it was under the govern-





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ment of the celebrated Abbasides--Harunal-Rashid and Al-Mamun-and that of the heroic Sultan Saladin. The last dynasty was, however, overthrown by the Mamelukes (1250); and the Mamelukes in their turn were conquered by the Turks (1516-17). The Mamelukes made repeated attempts to cast off the Turkish yoke, and had virtually done so by the end of last century, when the French conquered Egypt and held it till 1801, when they were driven out by the British under Abercromby and Hutchinson.

On the expulsion of the French a Turkish force under Mehemet All Bey took possession of the country. Mehemet Ali was made pasha, and being a man of great ability administered the country vigorously and greatly extended the Egyptian territories. At length he broke with the Porte, and after gaining a decisive victory over the Ottoman troops in Syria in 1839, he was acknowledged by the sultan as viceroy of Egypt, with the right of succession in his family. Mehemet Ali d. in 1849, having survived his son Ibrahim, who d. in 1848. He was succeeded by his grandson Abbas, who, dying in 1854, was succeeded by his uncle Said, son of Mehemet. Under his rule railways were opened, and the cutting of the Suez Canal commenced. After Said's death Ismail Pasha, a grandson of Mehemet Ali, obtained the government in 1803. His administration was vigorous but exceedingly extravagant, and brought the finances of the country into disorder. In 1866 he obtained a firman from the sultan granting him the title of khedive. In 1879 he was forced to abdicate under pressure of the British and French governments, and was replaced by his son Tewfik. In 1882 the "na-tional party" under Arabi Pasha revolted and forced the khedive to flee. On July 11 a British fleet bombarded Alexandria and restored the khedive, and at Tel-el-Kebir Arabi's forces were totally crushed on September 13. Λ rebellion in the Soudan under the leadership of Mohammed Ahmed, the so-called mahdi. now gave the government trouble. In 1883 the mahdi's forces annihilated an Egyptian force under Hicks Pasha in Kordofan. British troops were now despatched to Suakin and inflicted two severe defeats on the mahdi's followers there. But the British cabinet had resolved to abandon the Soudan; and General Gordon, already famous for his work in this district, was sent to effect the safe withdrawal of the garrisons (1884). By this time, however. the mahdi's forces were strong enough to shut the general up in Khartoum. For nearly a year he held the town, but perished (January, 1885) before the relief expedition under Sir Garnet Wolseley could reach him. Since then the idea of retaining the Soudan has been given up. Prince Abbas succeeded as khedive in 1892the British still retaining control.

Ancient Cirilization.—The civilization of the Egyptians had reached a high pitch from the earliest period to which we can trace their history. The masonry of the passages in the great pyramid has not been surpassed at any age. In mechanical arts the carpenter, boat-

builder, potter, leather-cutter, glass-blower. and others are frequently represented on their ancient monuments, and we see the blow pipe. bellows, and siphons: the press, balance, lever: the saw, the adze, the chisel, the forcers, the syringe, harpoon, razors; we have also glazed pottery, the potter's wheel, and the kiln: and dated specimens of glass of the time of Thoth-mes III, 1445 B. C. Gold beating, damascening. engraving, casting, inlaying, wire drawing, and other processes, were practised. The proc-esses of growing and preparing flax, as well as the looms employed, are all depicted. The social and domestic life of the ancient Egyptians is pictured for us on the walls of their The rich spent much of temples and tombs. their time in hospitality and entertainments, especially of a musical kind. In the country districts the superintendence of the agricultural works or the fisheries on their estates was varied by the sports and pleasures of a country life. The lower orders were poor and country life. uneducated, scantily fed and clothed, and held in contempt by the higher classes. But there was no strict separation into caste; and although the priests formed a ruling bureaucracy, the highest posts were open to the successful scholar. Next to the priesthood in importance was the military class or order, who were all landholders and bound to serve in time of war. Below these were the husbandmen, who paid a small rent to the king. Egyptian custom seems to have allowed but one wife, who occupied an honorable and wellestablished position as the "lady of the house."

The two main principles on which the religion of Egypt was based appear to have been the existence of an omnipotent Being, whose various attributes being defined, formed a series of divinities; and the deification of the sun and moon. Each group of divinities formed a triad composed of a chief male deity, with a wife or sister and a son, as Osiris, Isis, and Horus, or Amun, Maut, and Khonso. Among the other gods of the Egyptian Pantheon are Ra, the sun, usually represented as a hawkheaded man. Mentu and Atmu are merely two phases of Ra, the rising and the setting sun. The worship of the bull Apis is connected with Osiris. Scrapis is the defunct Apis, who has become Osiris. Seth, or Set, represents the power of evil. Ammon (Egyptian Amen), originally a local god, owed his importance to the greatness of his city. Thoth is the chief moon-god, and is Thebes. generally represented as ibis-headed. Anubis. the jackal-headed, belonged to the family of Osiris, and presided over mumification. Besides these deities the Egyptians worshiped beasts, reptiles, and even vegetables, probably as symbols. The Egyptians believed in the transmigration of souls, and in the existence of a future state, in which mankind would be rewarded or punished according to their actions while on earth.

Ancient Architecture and Sculptures. — The monuments of Egypt are of two main periods —those built in the times of the Pharaohs, or

native kings, and those built during the rule of the Greeks and Romans (subsequently to 330 B.C). The former period was by far the longer and more important, and to it belong the most characteristic examples of Egyptian architecture, such as pyramids, vast temples, some of them cut in the solid rock (as at Ipsambul), rock-cut tombs, gigantic monolithic obelisks, and colossal statues. The characteristic features of the style are solidity, boldness, and originality. Among its peculiar characteristics may be noted: symmetry of structure; the gradual converging of the walls of some of its edifices, especially of the propylæa or tower gateways of its temples; roofs and covered ways being flat, and composed of immense blocks of stone reaching from one wall or column to another, the arch not being employed nor yet timber; columns numerous, close, and massive, generally without bases, and exhibiting great variety in their capitals, from a simple square block to an elaborate composition of palm leaves or other forms suggested by vegetation; the employment of a large concave molding in the entablature, decorated with vertical flutings or leaves; walls and columns decorated with a profusion of sculptures in outline or low-relief, representing divinities, men, and animals, with innumerable hieroglyphics, brilliant coloring being often superadded. The pyramid is one of the best known forms of Egyptian art, and there is little doubt that these structures were intended as the tombs of kings. The leading features of the Egyptian temples were these: a gateway flanked by two lofty *pylons* formed the entrance to a square court. From this court the way leads through a second gateway to an inner court surrounded by a colonnade. Beyond this is the chamber of the temple known as the Hall of Columns, the center avenue of which was higher than the rest of the hall, and consisted usually of twelve columns, which supported a flat roof formed of massive stones, light being admitted at the sides of this elevated portion. To the Hall of Columns succeeded a series of smaller chambers, the roofs of which were generally sup-ported by six or four columns. These apartments frequently surrounded a dark chamber -the most sacred in the temple-the holy of holies. The surface of each architectural feature was engraved with its particular ornament appropriately colored. In the caretto, or hollow molding of the cornice, it was customary to place the name and titles of the Pharaoh or king; the architrave stone was symbolically ornamented with the names of the divinities to whom the temple was dedicated, and of the sovereign in whose time it was built. The abacus of the column was invariably decorated with the royal titles. The capitals were painted in accordance with the intention of the form; if, for instance, the expanded papyrus was shown, the leaves of the calyx would be yellow and the filaments green. Beneath were horizontal bands of blue and white, and then a representation of the king offering gifts to the gods of the temple; and.

lastly, the yellow and red lines at the base of the shaft signified the brown leaves that en-velop the base of the stalk of the natural plant. The Egyptian temple was invariably rectangular, with its walls inclining inward, and never more than one story high, and the approach to it was frequently through an ave-nue of sphinxes. The temples built during the sway of the Greeks and Romans, though having a general resemblance to the earlier ones, differed in some respects, as in the use of more elaborate capitals, more salient forms in the architectural and sculptural decorations, etc. A peculiar kind of mural sculpture was practised among the Egyptians, the outline of the object to be represented being cut into the surface, while the minor forms and rotundity are shown within this incised outline, thus forming a kind of "hollow relief."

**Egyptol'ogy**, the science of Egyptian antiquities, or that branch of knowledge which deals with the language, history, etc., of ancient Egypt.

**Ehrenbreitstein** (ā' ren-brIt-stIn), a Prussian fortress of great strength situated opposite the confluence of the Moselle with the Rhine, on a precipitous rock 387 ft. above the river, and inaccessible on three sides. The fortifications, which were erected in 1816-26 at a cost of \$6,000,000, can accommodate a garrison of 14,-000 men, and possess room for stores to last an army of 60,000 for a year.

**Eider** (i-dèr), a river of Prussia, rises in Holstein, and forms the boundary between Schleswig and Holstein, falling into the North Sea at Tönning after a course of 92 mi.

**Eider Duck**, a species of duck found both in America and Europe. Its favorite haunts are solitary rocky shores and islands. The eider duck is about twice the size of the common duck. The male is black, heal and back white, with a black crown. The female



Eider Duck.

is reddish drab spotted with black, and with two white bands on the wings. They feed largely on shellfish. crustaceans, etc. Their nests are usually formed of drift grass, dry seaweed, etc., lined with a large quantity of down, which the female plucks from her own breast. In this soft bed she lays five eggs, which she covers over with a layer of down.

If this, with the eggs, is removed the bird repeats the process. One female generally furnishes about 1 lb. of down, but the quantity is reduced by cleaning. This down, from its superior warmth, lightness, and elasticity, is in great demand for beds and coverlets; and the districts in Norway and Iceland where these birds abound are guarded with the greatest vigilance as a most valuable property. As found in commerce this down is in balls of the size of a man's fist, and weighing from 3 to 4 lbs. It is so fine and elastic that 5 lbs. of the best quality is sufficient for a whole bed. The down from dead birds is little esteemed, having lost its elasticity. The king eider duck is another species resembling the preceding and inhabiting the same coasts.

**Eiffel**, GUSTAVE. engincer, b. in 1832 at Dijon, France. He first attracted attention by the construction of a bridge, in which was employed for the first time, the compressed air method of sinking foundation cylinders. This was followed by many other works of great en-gineering skill. The most important among these and the one which has made his name famous throughout the civilized world is the Eiffel Tower of the Paris Exposition of 1889. This tower is 984 ft. high, and at the elevation The weight of 896 ft. it is 33 ft. in diameter. of iron used in construction is 7,300 tons. On the top is an immense lantern to which a system of elevators run. Mr. Eiffel was made an officer of the Legion of Honor in recognition of his genius. He was, however, connected with the Panama scandal of 1893, and was convicted of misappropriating funds of the canal company. For this he was sentenced to fine and imprisonment.

**Eisleben** (is'lā-bên), a town, Prussian Saxony, 25 mi. n.w. of Merseburg, celebrated as the place where Luther was born and where he died. There are many memorials of Luther, and also a bronze statue of the reformer erected in 1883. Copper is extensively worked in the neighborhood. Pop. 23,175.

**Eject' ment**, in law, an action wherein the title to lands and tenements may be tried and the possession recovered. It is commenced by a writ addressed to the tenant in possession and all entitled to defend the possession, bearing that the plaintiff lays claim to the property in question, and calling upon all interested to appear within a certain time to defend their right, failing which the tenant in possession will be ejected. In its older form the action was remarkable for certain curious legal fictions on which procedure was based.

**Ekat'erinburg**, a town, Russia, in the government and 170 mi. s.e. of Perm, founded in 1723 by Peter the Great. It is the center of the mining and metallurgy of the Ural region; and gem-cutting, making of machinery, cloth, candles, etc., are industries. Pop. 36,750.

**Ela'in**, the oily principle of fat obtained by submitting fat to the action of boiling alcohol, allowing the stearin to crystallize, and then evaporating the alcoholic solution. It possesses much the appearance and properties of vegetable oil, and forms soaps with alkalies.

#### Elasticity

E'lam, the ancient name of a country or region in Asia, east of the Lower Tigris. A king of Elam is said in the cuneiform inscriptions to have conquered Babylonia and Assyria about 2300 B. c. It was latterly incorporated in the Persian Empire.

E'land, a species of antelope inhabiting Africa, the largest of all the antelopes, being about the size of an ox. Its flesh, especially that of the thighs, which are dried and used



in this state, is highly prized, and consequently the animal is nearly exterminated in the neighborhood of Cape Colony, where it was once common. The color is a light or grayish brown, and it possesses a short mane. The horns, which are about 18 in. long and nearly straight, are spirally keeled.

Elastic'ity is the property in virtue of which bodies resist change of volume and change of shape, and recover their former figure or state after external pressure, tension, or distortion. The former is called elasticity of volume, the latter elasticity of shape. The name Compressibility is also used in connection with the elasticity of volume; and Rigidity, or resistance to change of shape, in connection with the latter. Fluids possess no rigidity whatever: they offer no permanent resistance to change of shape; while a solid body, unless it is distorted beyond certain limits, called the limits of elasticity, tends to return to its original form. Both fluids and solids possess elasticity of volume, and tend to resume their original volume after compression. The elasticity of volume of the former is perfect; whatever compression they have been subjected to, they return under the same conditions of temperature to precisely their original volumes when the forces of compression are removed. In the case of solids there are limits to their elasticity of volume as well as to their elasticity of form: thus gold may be made permanently denser by hammering. There is one law of elasticity. the celebrated law of Hooke: Strain is proportional to stress; or, in other words, whatever be the nature of the distortion the amount of it is proportional to the stress that produces it. This law is only considered as applicable so long as we do not go beyond the limits of elastiolty.

El'ater, the name of a family of beetles, remarkable for their ability to throw themselves to a considerable height in the air, when placed on their back, by a vigorous muscular movement. Hence their names of springing-beetles, clickbeetles, skipjacks, etc. When alarmed, the elater counterfeits death. Flowers, grass, and decaying wood are the habitations of these animals, which are almost always found singly. The larvæ are often very injurious to vegetation, especially those which devour the roots of herbaceous plants, and are known from their slenderness and hardness as wire worms. The fireffies of America belong to the family. They possess luminous properties, which are unlike those of the glow worm, etc., being seated near the head.

Elba, a small island in the Mediterranean, in the province of Livorno (Leghorn), Italy, separated from the mainland by the Strait of Piombino, about 6 mi. wide. This island is 18 mi. long and from  $2\frac{1}{2}$  to  $10\frac{1}{2}$  mi. broad, and is traversed by mountains rising to a height of over 3,000 ft. It is rich in iron, marble, granite, salt, etc., and iron ore is exported. Excellent wine and fruits are produced. It has two seaports, Porto-Ferrajo (the capital) and Porto-Longone. The Treaty of Paris in 1814 erected Elba into a sovereignty for Napoleon, who resided in it from May 4, 1814, to Feb. 26, 1815. Pop. 24,000.

**Eibe** (elb), a river of Germany, one of the largest in Europe. It rises on the s.w. slopes of the Schneekoppe (or Snowcap), one of the Riesengebirge, between Bohemia and Silesia. The length, including windings, is upward of 780 mi. It is more or less navigable for about 470 mi., but its estuary at Cuxhaven is much encumbered with sand banks. It is well stocked with fish. On July 1, 1870, the navigation of the Elbe was declared free from Hamburg to Melnik in Bohemia.

**Elberfeld** (el'bèr-felt), a town of Rhenish Prussia, 15 mi. e. of Düsseldorf. It has no historical or antiquarian importance, its prosperity, which is of recent date, being largely due to the cotton manufacture. Linen, woolen, silk, and mixed silk goods. ribbons, and velvet are extensively made and exported. There are numerous mills for spinning cotton twist, linen yarn, and worsted, and numerous dyeworks, and miscellaneous industrial establishments. Pop. 242,078.

ments. Pop. 242,078. **Elbeuf** (el-beuf), a town of France, dep. Seine-Inférieure, 11 mi. s.s.w. of Rouen, in a valley on the left bank of the Seine. It is well built, and has eight artesian wells. It has spinning mills, dye works, and is an important center for the production of woolen manufactures, chiefly of lighter cloths and fancy goods. It is also an entrepôt for the finer and heavier cloths of Louviers and Sedan. It communicates by steamers with Paris, Rouen, and Havre. Pop. 21,173.

**Elbing**, a seaport town of West Prussia, on the Elbing, near its entrance into the Frische-Haff. It was once a flourishing Hanse town, and is still a place of considerable industry and trade, the manufactures including iron goods, machinery, brass and tinplate goods. It has also ship building yards. Pop. 38,278. Elburz, a lofty mountain range extending

**Eiburz**, a lofty mountain range extending over Northern Persia, parallel with and overlooking the Caspian. Highest peak, Mt. Demavend, 19,400 ft.; average height, 6,000 to 8,000 ft.

Elder, a name given to different species of the genus Sambucus, nat. order Caprifoliaceæ. These are small trees or shrubs, with opposite and pinnated leaves, bearing small, white flowers in large and conspicuous corymbs, small berries of a black or red color, and bitand emetic properties. The wood of the young shoots contains a very large proportion of pith. The common elder of Britain is a wild shrub or small tree, distinguishable by its winged leaves; its clusters of small, cream-white flowers, and the small black berries by which these are succeeded, and from which a kind of wine is sometimes made. The dwarf elder or danewort is also found in many parts of Britain, and was vulgarly supposed to have sprung from the blood of the Danes. Two species inhabit North America, S. canadensis, a common plant from the 49th to the 30th parallel of latitude, the berries of which are black and have a sweet taste; and S. pubescens, which bears red berries, and inhabits Canada, the northern parts of New England, and the Alleghany Mountains. Elder wood is yellow. and in old trees becomes so hard that it is often substistituted for boxwood. Its toughness also is



Flowering Branch of Common Elder. a.-flower; b.-berries.

such that it is made into skewers, tops for fishing rods, etc. The light pith is utilized for balls for electric experiments, and various ointments, drinks, and medicinal decoctions are made from the bark, leaves, flowers, and berries.

**El Dora'do**, a country that Orellana, the lieutenant of Pizarro, pretended he had discovered in South America, between the Orinoco and Amazon rivers; and which he named thus on account of the immense quantities of gold and precious metals which, he asserted, he had seen in Manoa, the capital of the country.

Eleat'ic School, a Grecian philosophical sect, so called because it originated in Elea, a town of Magna Græcia (Southern Italy), of which also three of its most celebrated teachers, Parmenides, Zeno, and Leucippus, were natives. The founder was Xenophanes of Colophon, who came to Elea late in life, bring-ing with him the physical theories of the Ionian school, to which he added a metaphysic. The two schools soon drifted widely apart especially in respect of method. Starting from the observation of external nature, the Ionians endeavored to discover some elementary principle, as water, air, fire, or a combination of elements, by the action of which the phenomena they observed might be accounted for. The Eleans made the abstract idea of Being, or God, deduced from the contemplation of the universe as a whole, their starting point; and their reasonings sometimes led them to deny the reality of external phenomena altogether.

**Elecampane** (el-i-kam-pān'), a plant of the natural order Compositæ, found in the U.S. and Europe, and in Asia. It is 3 or 4 ft. high; the radical leaves are often 2 ft. and more in length; the flowers are large and yellow; the



Elecampane; a.-flower.

root, which is perennial, possesses a bitter camphor-like taste. It was formerly much used as a stimulant for all the secreting organs.

**Electoral College** in the U. S. is a body of men who are chosen by the prople of the several states to elect the president and vice-president. The number of electors chosen by each state is equal to the whole number of members that each state sends to both houses of Congress. No senator or representative or person holding an office of profit or trust under the U. S. can be chosen as an elector. The

#### Election

day on which electors are chosen must be the same in all states-the Tuesday next after the first Monday in November. It is ordained by the Constitution that the electors shall meet in their respective states on the first Wednesday in December and vote by ballot for president and vice-president, one of whom, at least, shall not be an inhabitant of the same state with themselves, and they shall make distinct lists of all persons voted for as president, etc., and of the number of votes for each: which lists they shall sign and certify and transmit, sealed, to the seat of government of the U.S., directed to the president of the Senate. A majority of the whole number of electoral votes is necessary to elect. If no candidate has a majority of votes, the House of Representatives must choose either of the three persons having the highest number of votes. On the second Wednesday of February of the year following the election the electoral votes are opened and counted by both Houses of Congress, which meet in the hall of the Representatives. The electors do not use discretionary powers but cast their votes for the candidates previously nominated by their respective parties.

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Election, in politics, the selection by voting of a person or persons to occupy some post or office. The most important elections are those of the members of the legislative assemblies of the different countries, and as to the manner in which these are carried out strict laws are in force. In such elections voting by ballot is now general. Jurisdiction of election laws of the U. S. extends to such officers of federal government as are elective, viz., the president, vice-president, and members of the House of Representatives. The election of officers of the state governments is regulated by the several state codes. The president and vice-president are elected by a college of electors, which college is composed of as many electors as there shall be senators and representatives in Congress at the time of the ap-pointment of such electors. The people vote pointment of such electors. The people vote directly for these electors. Members of Congress are elected as follows: Each state is entitled to two senators in Congress, who are elected by the legislatures of the several states: members of the House of Representatives are elected directly by the people. All citizens of the U. S. are entitled to vote except citizens of the District of Columbia. In 1870 persons of African descent were given the right to par-ticipate in elections. The states of the Union from time to time enact laws for the regulation and management of their local elections. embracing the choice of the officers of the state. city, and county. The constitutions of the several states secure to citizens the right of suffrage. The laws of each state provide the means of effecting the ends of the constitution, and prescribe the qualifications of voters, which vary somewhat in the different states. In all the states the following qualifications may be classed as universal: That the elector shall be over twenty-one years of age, neither lunatic nor a pauper, and prepared to take, if necessary, an oath of allegiance to the federal

government. The length of residence in the state previous to an election is fixed by the state law and varies in the different states. Property qualification is required only in Rhode Island. Some of the states require an ability to read and write. In the state of Wyoming the right of suffrage is extended to women, with power to hold office.

**Electrical Fishes,** a name given to fishes possessing the property of communicating an electric shock when touched with the hand or any electric conductor. One of the best known is the electric eel, a native of South America. It is of nearly equal thickness throughout; head and tail obtuse; ordinary length  $3\frac{1}{4}$  to 4 ft. The seat of the four electrical organs is along the under side of the tail, and they are said to possess the power of knocking down a man, and of painfully numbing the affected limb for several hours after the shock. After a few discharges, however, the faculty of producing a shock is impaired, and an interval of rest is required for a new storage of force.

**Electric Battery**, the original name of what is now more commonly called a battery of Leyden jars, the old name having been given before galvanic batteries were invented. See *Galranic Battery*.

Electric clock, a clock driven or controlled by electricity, the latter being the ordinary meaning of the term. One clock driven in the ordinary way can be made to control by electric currents another clock (or clocks) also driven in the ordinary way so as to make it keep accurate time. The method of R. L. Jones, more or less modified, is now in very extensive use. By means of it one high-class clock compels a number of other clocks at considerable distances to keep time with it. The clocks thus controlled ought to be so regulated that if left to themselves they would always gain a little, but not more than a few minutes per day. The pendulum of the controlling clock, in swinging to either side, makes a brief contact, which completes the circuit of a galvanic battery, and thus sends a current to the controlled clock. The currents pass through a coil in the bob of the pendulum of the controlled clock, and the action between these currents and a pair of fixed magnets urges the pendulum to one side and to the other alternately. The effect is that, though the controlled clock may permanently con-tinue to be a fraction of a second in advance of the controlling clock, it can never be so much as half a second in advance. An electrically controlled clock usually has close beside it a small magnetic needle, which moves to the one side or the other according to the direction of the current, and thus shows whether the currents are coming. The arrangements are usually such that at every sixtieth second (that is, at every exact minute) no current is sent, and the needle stands still. Any small error is thus at once detected.

**Electric Dynamo.** The commercial electrical generator is called a dynamo. It consists of an armature, which is made to revolve at a high speed, by means of a steam engine,

water wheel, or other prime mover, in the field of a powerful electro-magnet. The practical principle at the base of all dynamos is the fact, that every motion of conductor past a magnet, or of a magnet past a conductor, induces electricity. The revolving part of a dynamo, called the armature, is made up of copper wires or bars wound upon an iron core, which may be either a ring, drum, or disc. The field magnets of the dynamo are placed in relation to the armature so that it revolves in the magnetic field, cutting the lines of force. The copper bars are insulated from the core and from each other by mica or paper, and are so wound around the core that one part of the copper is entering the field, thus increasing its "potential," while the other is leaving the field and decreasing it, producing a flow from positive to negative. The current is collected, or brought to one conductor, by means of the commutator of the dynamo, and is led to the conductor through brushes of copper or carbon.

If the magnetic field is strong, and there are many turns of wire on the armature so that each wire cuts many lines of force in a given time, a current of high tension is secured. If the magnetic field is weak, and the armature has but few turns of wire, the current is low tension. In some dynamos, the armature revolves in the field, and in others the field magnets revolve around the armature. Dynamos are continuous when the current is direct or flows one way all the time, and alternating when the current rapidly and constantly changes from positive to negative.

Tesla's oscillator works on the reciprocating principle. That is, the armatures are on each end of a shaft which project beyond a steam box, in which a pair of pistons, actuated by steam, drive the shaft, shuttle fashion, back and forth at an extremely rapid rate. The armatures shoot back and forth in the magnetic field of a powerful electro-magnet, and the result is a current of tremendous strength, high voltage, and great frequency.

high voltage, and great frequency. Electric Heating. When a c When a conductor is large enough it carries the electrical current without heating, but when the wire or conductor has not enough capacity for the current the resistance gives rise to heat. Electricians have taken advantage of this fact to use electricity for heating, cooking, and welding. The wire is imbedded in an enamel which has about the expansive degree of the conductor. The current, meeting resistance, heats the wire. If there was no substance present to convey off this heat the wire would fuse or weld, but the enamel carries off the heat generated, and the current continues to pass along the wire. In practise, the enamel plates, with the wire buried in them, are placed in ovens, on the bottoms of kettles, pans, and other kitchen utensils, in broilers, gridirons, and on the polishing surface of flatirons. By this means frying, boiling, baking, broiling, and stewing are performed by the heat produced by electricity. Welding iron and steel and other metals susceptible of being united un-

47

der high temperatures and pressure, is done by pressing together the surfaces to be welded, and then passing through them a current of high voltage. In practise, the parts to be welded are clamped together, and more pressure is applied when the metal, at the point of weld, is brought to a welding heat. One particular advantage found in welding by electricity is that the surfaces do not oxidize, consequently, there is no necessity for using a flux.

Electric' ity, the name given to the unknown cause of certain effects of various kinds which are found to be closely connected one with an-other. They include two distinct kinds of attraction and repulsion (electrostatic and electrodynamic), the magnetization of iron, the deflection of magnetic needles, the production of heat and light in certain circumstances, the separation of certain chemical compounds into their constituents, and spasmodic actions on the nervous and muscular systems of animals. The name is derived from the Greek *electron* (amber), the fact that amber when rubbed attracts light particles, such as small pieces of paper, having been known to the ancient Greeks. Friction was the only artificial source of electricity employed until Galvani, near the close of last century, accidentally obtained it by the contact of two metals with the limbs of a frog; and Volta, developing Galvani's discovery, invented the first galvanic or voltaic battery. Electricity produced by friction is called *frictional electricity*; that produced by chemical action on metals, rollaic electricity.

Conductors and Nonconductors. - All substances which, like amber, could be made to show electrical attraction by rubbing them, were called *electrics* by early writers on electricity. They included glass, amber, sulphur, shellac, rosin, silk, flannel, etc. The name nonelectrics was given to other bodies which were supposed not to be susceptible of excitation by friction. The bodies called nonelectrics were also called conductors, from the power which they exhibited of allowing electricity to pass through them. Electrics were also called nonconductors. The names conductor and non-conductor are still retained, but the names electric and nonelectric are discarded as being founded on a mistake. Electricity can be excited by the friction of a conductor against a non-conductor, and is, in fact, so excited in the ordinary electrical machine, in which glass rubs against an amalgam spread on a cushion. A metallic rod furnished with a glass handle can be electrified by rubbing it with flannel, the glass preventing the electricity from being conducted away through the hand. Substances thus electrified exhibit two opposite kinds of electricity, known Bodies respectively as positive and negative. charged with the same kind of electricity repel each other: those charged with opposite kinds attract each other. An instrument for indicating the presence of electricity is called an electroscope.

*Electric Conduction.*—All solid and liquid substances allow electricity to pass through them to some extent, but the differences of degree are enormous. The best conductors are the metals, especially gold, silver, and copper. Perfectly pure copper conducts about seven times as well as iron. Substances which have excessively small conductive power are not called conductors, but insulators, so that a good insulator is another name for an excessively bad conductor. Among the best insulators may be mentioned glass, paraffin (the wax, not the oil), ebonite, shellac, mica. india rubber, and gutta The ratio of the conducting power of percha. a metal to that of one of these substances is about a thousand million billions to one. Water occupies an intermediate position between these two extremes. In experiments with frictional or influence machines it behaves as a conductor, but in experiments with galvanic batteries it behaves as an insulator. The word *resistance* is used in the opposite sense to conducting power; a good insulator is said to have high resistance, and a good conductor to have low resistance.

Electrostatics is that branch of the general science of electricity which treats of the repulsions between like and the attractions between unlike kinds of electricity, The fundamental law of electrostatics is, that if e and  $\dot{e}$  denote two quantities of electricity collected in two spaces very small in comparison with the distance between them, the mutual force which they exert upon each other is directly as the product ed, and inversely as the square of the distance. If the two quantities ed are both positive, or both negative, the force is a repulsion, but if one is positive and the other negative, it is an attraction. Electrostatic attractions and repulsions manifest themselves in two distinct ways: namely, 1, as attractions and repulsions between electrified bodies: 2. as producing changes in the distribution of electricity on conductors. This second effect is called *electrostatic induction*. The different portions of the charge of one and the same conductor act upon one another according to the general law of repulsion, and thus produce the actual distribution, which is entirely on the surface, all electricity being repelled from the interior. The interposition of an insulating substance between two quantities of electricity alters the amount of the forces which they exert upon each other. In a broad sense electrostatics may be held to include within its range all the phenomena of frictional electricity and of the electricity produced by influence machines, such as those of Holtz, Voss, and Wimshurst. See Electric Machine.

Electric Discharge.—The rapid escape of electricity from a charged body is an electric discharge. When the discharge takes place through a conductor it is called continuous, and when it takes place through a nonconductor (for example through air) it is called a disruptive discharge. The name "electric discharge" is especially applied to cases in which the escaping electricity produces luminosity. Three kinds of such discharges have been distinguished—the spark, the brush, and the glow. The spark is accompanied by a sound which varies from a faint crack to a loud bang. In

# Electricity

nature it is seen on the largest scale in the case of lightning, which is a discharge of atmospheric electricity. In many cases the electric spark presents no definite shape, but looks like a mere point of fire, or, if very bright, is enlarged by its dazzling effect on the retina; but when it leaps across a space of several inches of air it assumes a crooked shape bearing a remarkable resemblance to a flash of light-ning. The brush discharge is only faintly luminous. It occurs especially at sharp points and edges of highly-charged bodies. It is barely visible by daylight, and its appearance in the dark is that of a luminous halo. It projects only a small distance into the air surrounding the body from which the charge is escaping. The glow discharge simply renders the surface of the body luminous, and does not extend into the air at all. In some modern electric apparatus beautiful effects of electric discharge are shown. Thus by causing a discharge to take place in highly-rarefled air or gas it is made to jump across a considerable interval, and the whole intervening space is filled with a beautiful nebulous luminosity, the color of which depends on the nature of the gas. If the vacuum is sufficiently good the luminosity is seen to be disposed in transverse stripes, technically called striæ.

Dissipation of Electricity.—An electrified body left to itself gradually loses its electricity. This effect is due to more causes than one. Ĭſ the body is a conductor and has any sharp points or edges these afford a ready channel for the escape of the charge into the air. Some loss occurs by particles of dust in the air being attracted to the body and then repelled after coming in contact with it. But the chief loss in the case of a smooth conductor on insulating supports usually occurs by leakage over the surface of the supports, owing to a thin film of moisture from which it is difficult to keep them free. This is especially the case with glass supports. Dissipation can be almost completely prevented by surrounding the electrified body with an artificially dried atmosphere. The most usual means of doing this is to place a shallow dish of sulphuric acid in the closed vessel in which the body is contained. The loss by dissipation can thus be reduced to one or two per cent. of the entire charge per diem.

Distribution of Electricity. — When a conductor has a permanent charge there is no electricity in its interior. The charge resides entirely at the surface, and is not distributed equally over the whole surface, but is thickest (so to speak) at those parts which project most. At sharp edges, and still more at sharp points, the density is exceedingly great, and hence the electricity has a strong tendency to leak away.

Electric Currents.—What is known as an electric current is a peculiar condition of a wire or other conductor of electricity. in virtue of which it deflects magnetic needles in its neighborhood, magnetizes a piece of soft iron round which it is coiled. has its own temperature raised, and exhibits various other effects. This

# Electricity

condition of a wire occurs both in connection with frictional and voltaic electricity, and can be produced by attaching its ends to the two terminals of a galvanic battery, or to the two terminals of a magneto-electric machine, and in various other ways. An electric current may be regarded at pleasure as consisting in the flow of positive electricity in one direction through the wire in question, or of negative electricity in the opposite direction, or of both electricities simultaneously one in each direction. What is conventionally called the direction of the current is the direction in which the positive electricity may be regarded as flowing. The "strength" of a current denotes the quantity of electricity that passes through the wire in the unit of time. The deflecting force which a current exerts on a magnetic needle-other things being equal-is propor-tional to the strength of a current; but the quantity of heat which it generates in a given time is proportional to the square of its One effect of currents is the decomstrength. position of certain chemical compounds, and this effect, like that first mentioned, is simply proportional to the strength of the current. Instruments for measuring the strengths of currents by chemical decomposition are called voltmeters, and instruments for measuring them by the deflection of magnetic needles are called galvanometers. The currents by which telegraphs are worked are usually obtained from galvanic batteries; but the far stronger currents required for electric lighting are usually produced by machines called dynamos driven by steam or water power. The currents in such machines are due to magneto-electric induction.

*Electro-dynamics* is that branch of electrical science which treats of the attractions and repulsions exhibited between wires or other conductors through which currents are passing. If two wires are parallel, they will attract each other when currents are passing the same way through them both, and will repel each other when the currents are opposite. If the wires are inclined to each other at any angle, there is not only an attraction or repulsion, but a still more marked tendency to rotation which is not satisfied till the wires have become parallel and the currents flow in the same direction through them both. When there are only two straight wires these forces are feeble and require delicate apparatus for their exhibition; but by employing coils of wire the forces are multiplied, and an instrument constructed on this principle called the electro-dynamometer has been much employed. for the measurement of currents. The whole science of electro-dynamics is due to Ampère who discovered its main facts, and reduced them by ingenious experiments, combined with very abstruse reasoning, to a single mathematical formula which includes them all.

Velocity of Electricity.—Daily experience with the electric telegraph shows that electrical action is propagated with great rapidity. The time that intervenes between the sending of a signal from one station and its visible effect

at another, depends on a variety of circumstances. The time is notably longer for underground or submarine wires than for wires suspended in the air on poles. When one end of a long submarine or subterranean telegraph wire is suddenly put in connection with a galvanic battery or other source of electricity, the current which flows out of the other end into the earth does not begin sharply but gradually, and takes a measurable time to attain its full strength. Hence an instrument which is delicate enough to show a very feeble current, will show the effect earlier than one which requires a strong current to move it. An instrument in which the moving parts are small and light has also an advantage over one in which they are large and heavy. Something, too, depends on the nature of the source of electricity employed. A source which acts with sudden violence, like the discharge of a Leyden jar or an induction coil, will make the effect appear earlier than a comparatively gen-tle source, such as an ordinary galvanic bat-tery. Electricity has not a definite velocity like light or sound. It is rather comparable to waves on water, which travel with very va-rious speeds according to their length and the depth of the water. The highest speed ever observed in the transmission of electric effects was that obtained by Wheatstone in his celebrated experiment with a rotating mirror. In this experiment a Leyden jar was discharged through half a mile of wire with three interruptions in it, at each of which a spark was formed by the electricity leaping across. One interruption was in the middle, and the other two were at the ends, one end being close to the knob of the jar, and the other end close to its outer coating. The wire was so arranged that all three interruptions were near together; and by observing the reflections of the three sparks in a rotating mirror, he was able to discover that the middle spark occurred sensibly later than those at the two ends, these latter being simultaneous. The lagging of the middle spark behind the other two was regarded as the time that electricity took to travel through a quarter of a mile of wire, and the velocity thus found for electricity was 230,000 mi. per second, a velocity greater than that of light, which is between 185,000 and 186,000 mi. per second. Observations made in connection with the use of the electric telegraph for determining longitudes, have shown that the time which intervenes between the sending and receiving of a signal was about four tenths of a second between Aden and Bombay, two tenths of a second between Alexandria and Malta, two tenths between Malta and Berlin, and about one eighth of a second between Greenwich and Valentia.

Electrical Theories.—If we endeavor to explain electrical phenomena by regarding electricity as a substance, we are met by two difficulties: one is that electricity adds nothing to the weight of a body; the other is that electrical phenomena are dual, as if there were two opposite kinds of electricity which destroy each other when they unite. Du Faye mainł

tained the existence of two electrical fluids endowed with opposite qualities, and called them the vitreous and the resinous fluid. Franklin endeavored to account for the same phenomena by assuming the existence of a single electric fluid, and supposing an electrifled body to be a body which possesses either more or less than the normal quantity of this fluid. If more, it was said to be positively, and if less, negatively electrified. Franklin's positive and negative corresponded with Du Faye's vitreous and resinous. Whenever electricity is generated the two opposite kinds are always produced in exactly equal quantity. Modern theories favor the idea that electricity is not a substance or a pair of substances, but a special kind of motion, and that the two opposite electricities are two opposite states of motion of the particles of a medium which is believed to pervade all bodies and all space: the same medium whose vibrations constitute light.

Applications of Electricity. — The employment of electricity commercially and industrially is daily increasing in importance. The electric telegraph has long been familiar, and the telephone is now almost equally so. Electric lighting is rapidly extending, and electric railways or tramways are increasing in number. The operations of electro-metallurgy are also of great importance.

of great importance. The Electric Transmission of Power is the transmission of power to a distance by electricity, effected by employing the source of power to drive a machine called a dyname which generates an electric current. This current is conveyed by a copper conductor insulated from the earth to the distant station. where it passes through a machine called an electro-motor, one part of which (called the armature) is thereby made to revolve, and imparts its motion to the machinery which is to be driven.

This is the simplest arrangement, and is that which is commonly employed when the original currents are not of such high tension as to be dangerous to life in the case of accidental shocks. There is, however, a great waste of power in employing low-tension currents when the distance is great; hence it is becoming a common practise to employ hightension currents for transmission through the long conductor which connects the two stations, and to convert these into low-tension currents before they reach the houses or workshops where they are to be used. This is done sometimes by employing the high-tension currents to drive a local dynamo which generates low-tension currents, sometimes by employing them to charge storage cells arranged in long series, and afterward connecting these cells in shorter series. The discovery that a Gramme machine is reversible-that is to say, when two Gramme machines are coupled together. one operating as a generator the other will act as a motor-was an important step taken in the transmission of power. Numerous efforts. since then, have been made to utilize elec-tricity for the transmission of power over a

long range. For this purpose the alternating current seems eminently adapted. The possibilities offered by electrical transmission of water power for sections of country favored with waterfalls are numerous, and should result in making them great industrial centers. Already arrangements have been made to utilize the immense power now wasting at the Niagara Falls by electrical transmission. From a point above the Falls to a point below, a tunnel through the rock has been completed and has developed 125,000 horse power, which is carried to Buffalo, N. Y., and other points.

The phrase, "distribution of electricity" has been used during the last few years to denote the supplying of strong currents of electricity from central stations where they are germinated, to houses, street lamps, etc., in their vicinity. The central station contains a few powerful dynamo machines, driven usually by steam power. The positive and negative terminals of the dynamo are put in connection with the positive and negative main conductors which are to supply the district, and from these mains smaller conductors branch off to the houses or lamps. All these conductors are of copper, that metal when pure having seven times the conductivity of iron. Different methods are in use for keeping the supply of electricity steady in spite of the varying de-mands made upon it. In some systems of distribution, instead of the two main conductors being one positive and the other negative, each is positive and negative alternately, the reversals taking place some hundreds of times per second. The currents are then said to be alternating. When such reversals do not take place, the currents are said to be *direct*.

To produce electricity direct from heat, without the intervention of steam boilers, engines, and dynamos, has been the dream of electricians for years. In the latter part of 1806, Dr. W. W. Jacques of Boston, Mass., discovered that if oxygen, whether pure or diluted, as in air, be caused to combine with carbon, not direct, as in the case of combustion, but through an intervening electrolyte, the energy of the carbon may be converted directly into electrical energy instead of into heat. Practically the active or oxidizing element of the Jacques cell is supplied with an excess of oxygen by means of an artificial air blast or air pump. The electrolyte, whose first action after the cell is set up, is to release its oxygen and so permit it to attack the carbon, is thus continually renewed by fresh charges of oxygen, which are at once carried to the carbon for a continued attack. The carbon is consumed and electrical energy is developed in a corresponding degree, the rate of consumption and the strength of the electric current being gauged by the rapidity with which the air is supplied to the electrolyte compound.

The generating apparatus of the Jacques cell consists of a pure iron pot, surrounded by a suitable furnace, and containing caustic soda, into which extends a circular piece of carbon. An air pump forces into the caustic soda an excess of oxygen. One pole is the carbon cylinder, the other is the iron pot. The apparatus is set in operation by bringing the furnace and its enclosed generator and electrolyte of caustic soda to a temperature of about 1,000°. From a battery of 100 Jacques cells, each 12 in. deep and 1½ in. in diameter, a current has been obtained averaging about 90 volts and supplying 30 16-candle power incandescent lamps 19 hours.

X-Rays is the popular name of the phenomena caused by the discharge of electricity through highly rarefled air, gases, and vapors. It was given that name by Prof. Roentgen, the eminent German scientist, who first produced "shadowgraphs," or photographs of substances which are opaque to ordinary light, because scientists differed as to the exact nature of the rays. They are called "cathodic" rays because they emanate from the kathode (or cathode), the negative electrode in Crookes's tube. In 1857 Dr. Heinrich Geissler, a celebrated German scientist, passed a current through a tube from which the air was exhausted. The tube from which the air was exhausted. tubes were made of thin glass, and in each end platinum wire passed through to the inside of These were the well-known Geissler the tube. tubes, which for many years have been used to illustrate the phenomena which accompanies the discharge of electricity through highly rarefied gases and vapors. The platinum wires usually were tipped with small spheres or disks of platinum or aluminum. When the terminals of a secondary coil were connected with the electrodes of the tube, and an electric current was sent over the wires, various colored-light effects take place in the tubes. Dr. Crookes, an English scientist, succeeded in exhausting the air in a Geissler tube to a much higher degree than Geissler was able to do. The exhaustion was carried as high as the one twenty-millionth of an atmosphere. In experimenting with a Crookes's tube, Prof. Roentgen discovered that the rays from the cathode electrode possessed the power of passing through opaque substances such as leather, paper, wood, flesh, and other materials that cannot be penetrated by ordinary light. He found that the radiation acted on sensitive photograph plates, so that he was able to produce shadows of substances which, in varying degrees, retarded the passage of the cathodic rays. For instance, he was able to photograph coins concealed in leather pocket books; the bones of the hand, arm, leg, etc., lead pieces hidden away between the leaves of a thick book, nails in a block of wood, etc. He gave his discovery to the world in the early part of 1896, and at once the Roentgen X-rays caused a furore in the scientific world. It was found that the X-rays could be used for locating fractures of bones, bullets, and other foreign substances in the human body, and at last the entire skeleton of small birds and animals was photographed by interposing the living body between a Crookes's tube and the photographic plate. Development of the X-rays extended until it was possible and practical to show the entire human skeleton on a phosphorescent screen.

The Crookes tube generally employed is irregularly globular in form, with the cathode tipped with an aluminum button or circular plate. It is actuated by a storage battery or other, source of electricity through a Ruhmkorff coil or other form of spark coil. The Crookes tube is placed on one side of the hand, body, or other object to be "skiagraphed" and the X-rays, passing through the object, affect the sensitive plate, and a shadow picture is the result. This process is called "skiagraphing. The picture is not a photograph, in the ordinary sense of the word, but is a shadow, in which the deeper or darker parts take the form of the material which offers the greatest re-sistance to the passage of the X-rays. In practise the current is automatically broken many times a second. X-rays are a form of radiation which some scientists believe is similar to the etheric vibrations that produce the phenomena of light, electricity, heat, magnetism, etc.

**Electric Light**, a light obtained through heating a suitable body to incandescence by causing a current of electricity to pass through the body. The substance usually employed for this purpose is carbon, which has two recommendations: first, its power of bearing a very high temperature without melting: and secondly, its high emissive power, which is the source of most of the light in the flame of a candle, an oil lamp, or a jet of gas.

Until quite recent years the only kind of electric light in practical use was what is now called the arc light. The arc light is obtained by causing two sticks of carbon, one of them in connection with the positive and the other with the negative terminal of a battery or dynamo, to touch each other for an instant so as to complete the circuit, and then separating them and keeping them steadily at a small Before the carbons have distance apart. Before the carbons have touched, the cold air between them prevents the current from passing, but as soon as they touch they become intensely heated, and if they are not separated too far the air between them is hot enough to serve as a conductor. The light is emitted partly by the ends of the carbons, especially of the positive carbon, and partly by the gaseous matter (containing also fine particles of solid carbon) which occupies the intervening space and forms the arc or streak of light joining the two carbon points. When the source of electricity is an alternating current machine each carbon is alternately positive and negative several times in a second, and the two points behave alike. When the source is a direct current machine or a galvanic battery the positive carbon wears away about twice as fast as the negative, and the positive carbon becomes hollow at the end, while the negative remains pointed. The hollow in the positive carbon is the brightest part of the whole arrangement; and when a beam of light is to be thrown in some definite direction, care should be taken that this hollow is exposed to view in that direction.

To keep the carbons at the proper distance apart a special contrivance called a "regulator " is employed. There are many varieties of regulator, but they all depend on the principle that increase of distance between the carbons causes increase of resistance. They usually contain an electro-magnet through which either the whole or a portion of the current passes, and the variations in the strength of this magnet arising from change of resistance are taken advantage of to cause the motion, in one direction or the opposite, of a piece of iron which locks and unlocks the mechanism.

As regards the material of the carbon sticks, Sir Humphry Davy used pieces of wood charcoal, and the substance deposited in the interior of gas retorts has sometimes been employed, but it is now usual to employ a mixture of powdered carbon (from gas retorts), lampblack, syrup, and gum. with a very little water. The sticks are obtained by forcing this pasty mixture through a draw plate: they are then baked, and after being again impregnated with syrup, are heated to a high temperature.

Arc lights give the largest amount of light for a given amount of horse power expended in driving the dynamo; but incandescent lights, which have been introduced by Edison, Swan, and other inventors of late years, possess several advantages. Owing to the absence of oxygen, there is no combustion in an incandescent lamp, and hence the carbon does not waste away. The want of means to obtain a sufficiently good vacuum was the chief cause which prevented the earlier introduction of such lamps. Sprengel's mercurial pump. with Crookes's improvements, has supplied this want. All the incandescent lamps agree in having a carbon filament suspended in racuo. but they differ in the mode of preparation of the carbons and in other details.

The light of an incandescent lamp is extremely steady, affording a great contrast to the flickering which is neveraltogether absent from arc lights. Its temperature is lower, and hence its color is not blue or violet, like that of most arc lights, but slightly yellow, though whiter than gas. It is superior both to gas and to the arc light in giving off no products of combustion to vitiate the air of an apartment. The Jablochkoff light occupies an intermediate place, but more nearly resembles the arc lamps. It is lighted by temporarily inserting a piece of carbon to connect the ends of the two sticks; and after a fair start has once been obtained, the top of the plaster of paris is hot enough to act as a conductor. Its incandescence contributes a portion of the light of the lamp, and it gradually burns away so as never to project quite as far as the carbons. Alternating currents are now always used with it, as the two carbons may then be exactly alike and will wear away equally.

The introduction of electric lights for commercial uses may be said to date from the lighting of the Avenue del Opéra at Paris by Jablochkoff lamps, a few years previous to the Paris Electrical Exhibition of 1881. The electric light, as previously known, was considered

too dazzling for street purposes, but the Jab-lochkoff "candles," which, even when naked, are far less dazzling than "arc" lights, were concealed from direct view by opal globes, and instead of single points of dazzling brightness, presented an appearance like a row of full moons. Inventive ingenuity has been largely expended upon the details of electric lighting, as the records of the Patent Office will testify -for cut-outs, arc-lamp regulators, sockets and keys, dynamo regulation, systems of distribution, etc. The generator has attained an unrivaled degree of perfection, almost 95 per cent. of the power obtained being yielded as electric energy. The continuous current-dynamo is now a work of art. The various steps of its construction are operations of peculiar skill. The electric light has been applied to a great. many special uses; for instance, in dentistry and surgery the incandescent lamp is used to explore hidden recesses of the human frame, and on ships the arc lamp is a searchlight. In submarine work electric lighting has proven of great value. Street lighting with arc lamps has had an enormous development, and nearly all towns of any progress in the U. S. have their streets electrically lighted. The extraordinary development in the application of alternating currents is specially notable. This system of lighting has spread with such rapidity that it is now in general use all over the U.S. The meter has received its due share of attention from the unwearying inventor, more than 200 patents from the U.S. Patent Office having been issued for direct and alternating currents.

In 1896, Nicola Tesla, and D. McFarlane Moore, American electricians, exhibited still another form of electric light. This is called "fluorescent" and "glow" lights, and is obtained by the passage of electric discharge through the rarefled gas in a vacuum tube. In such light there is no combustion and only a very little heat. Moore has succeeded in filling tubes six feet long and three inches in diameter with a bluish white light, and Tesla, by employing a current of extremely high frequency and high tension has developed an intense electro-magnetic field, so that he is able, by merely placing an exhausted lamp bulb within this field, to produce a glow without use of conducting wires. This method of electric lighting at this time (1897) is yet in the experimental stage.

**Électric Machine**, any machine for producing powerful electrical effects. The name is, however, seldom applied to machines depending on magneto-electric principles, and is practically confined to two classes of machines those which act by friction, and those which act by electrostatic induction. The former are called Friction Machines and the latter Influence Machines. For many years the former were the only kind known, but they have now been almost superseded by the latter. In friction machines the electricity is generated by the friction of either a glass cylinder or a circular glass plate against cushions covered with an amalgum of zinc and tin. The positive electricity which is thus developed on the surface of the glass is given off to an insulated brass conductor furnished with teeth like those of a comb, the sharp points of which are nearly in contact with the glass. The negative electricity which is at the same time generated on the cushion must be provided with some means of escaping, or the action of the machine would soon stop. It is usually allowed to escape to the earth by a brass chain connected with the cushions; but in some machines a negative conductor connected with the cushions is insulated like the positive conductor by a glass support. Negative sparks can then be drawn from this conductor at the same time that positive sparks are drawn from the other.

Electric "power" is a phrase of such common usage that it has reached the dignity of an accepted term. As a matter of fact, electricity, in itself, is never a source of power. It is an agency, a form of energy, by which mechanical power may be transferred from an ordinary prime morer, as a steam engine, water wheel, or wind mill, to a secondary motor. The motor is that which does the work. In its important application to machinery, electricity performs an office similar to that performed by a line of shafting, a belt, cable, rope, or a pipe filled with compressed air; it transmits power. Although some small motors are energized or driven with batteries as the source of power or energy; and some have the initial power producer in the form of windmills and water wheels, the bulk of the work done by the electric motor has the stationary steam engine as the prime motor mover.

The steam engine drives the dynamo; the dynamo, the generator of the electric current, is connected by wires, called conductors, with the motor. When the motor is used to propel machinery, it takes the place of the steam engine, and by means of shafting. belts, or other mechanical appliances for transmitting power, gives motion to machinery. Another, and a rapidly extending method of employing electric motors for propelling machinery, is to give each machine or group of machines in a machine shop, railroad shop, printing establishment, etc., such motors, being connected with the dynamo in the engine room. By this method, the use of power, wasting, shafting, and belting either is entirely discontinued, or such appliances are used simply when one motor operates a group of machines.

It is estimated that shafting and belting absorb over 30 per cent. of the gross power of engines before the delivery of any power whatever for actual work. Thus the electric motor, installed for operating individual machines, or groups of machines, directly saves money by removing the wasteful loss of power due to the friction and weight of belting and shafting. The development of the electrical industry may be shown by the single fact that in 1886 there were less than 5,000 electric motors used in the U.S. At least 4,000 were driving small fans and sewing machines. At that time a 10-horse power motor was considered very large, and it was estimated that less than 50 such motors were in use. In 1897 over 500,000 electric motors are used. Motors of over 100 horse power are common, and there are some of over 1,000 horse power in actual use. In some establishments over 500 motors are in use, aggregating, in some cases, more than 6,000 horse power. Concerns that use 100 or more motors, requiring for their operation from 1,000 horse power and upward, are common. In many cities and towns, a central power station, generally also used for electric lighting, furnishes "power" for motors to their subscribers.

Wherever there is water power in a community of any considerable size, the water wheels drive the dynamos, which generate electricity for motors. In some of the northwestern states power obtained from the flow of water from artesian wells, is transformed into electric energy, which furnishes electric light and electric "power." The most notable instance of electricity generated with water power used as a prime mover, is to be found in the immense hydraulic work of Niagara Falls.

Electric Railways .- In its application to railroads and street railways, electricity has made marvelous strides. Electricity is capable of being supplied to a moving motor through fric-tional or rolling contact. No other agency capable of transmitting power possesses this all-important quality. So it is, that by means of wires or other forms of conductors, extended along the road-bed of the railway, in such wise that the "trolley wheel" contact shoe, or other form of contact, can readily touch the conductor, the electric current is supplied to the motor no matter how swiftly the motor travels. As early as 1864 Jean Henry Cazal, a French engineer, proposed to utilize natural powers; such as water, air, and wind for operating railways, by the electrical transmission of power. In 1879 Dr. Werner Siemens exhibited an electric railway at the Industrial Exhibition in Berlin. This railway was circular, about 1,000 ft. long, and the motor was five horse power. Thomas A. Edison was the first to construct an actual dynamo-electrical railway in America. This was done in the spring of 1880, at Menlo Park, N. J., the track being 90 rods in length. Stephen D. Field, of California, exhibited an electric locomotive at the Exposition of Railway Appliances in Chicago, June, 1883. Both Edison and Field utilized the rails of the track to convey the current to the motor. Dr. Joseph R. Finney of Pittsburg, is credited with the invention of the "overhead trolley" system of electric traction. In 1882 his first experimental car was exhibited and successfully operated in Allegheny, Pa. A suburban line, 2 mi. in length extending from Baltimore to Hampden, Md., was the first electric street railway operated in America for actual commercial service. It was put in operation Sept. 1, 1885. In 1888, all the street railways of Richmond, Va., were equipped with elec-tric motors. In 1896, according to Poor's Manual of Railroads, there were 13,556 mi. of

# Electric Railways

electric street railway in operation in the U.S., divided among the states as follows:

State.	Miles.	State.	Miles.
Alabama	95.33	Missouri	635.39
Arizona	6.00	Montana	56.66
Arkansas	37.80	Nebraska	200.60
California	465.61	N. H'pshire.	41.00
Colorado	202.39	New Jersey	748.00
Connecticut.	327.69	New York	1,340.75
Delaware	28.75	N. Carolina	39.85
Dist. of Col	77.80	Ohio	1,167.14
Florida	40.50	Oregon	108.00
Georgia	254.50	Pennsylv'nia	1,697.10
Idaho	3.50	Rhode Island	132.03
Illinois	949.60	8. Carolina	10.00
Indiana	335.38	S. Dakota	13.37
Iowa	220.37	Tennessee	212.00
Kansas	169.61	Texas	276.66
Kentucky	234.25	Utah	9.80
Louisiana	179.52	Vermont	28.88
Maine	108.57	Virginia	206.70
Maryland	332.56	Washington.	247.77
Massach tts	1,112.26	W. Virginia.	27.00
Michigan	562.75	Wisconsin	276.13
Minnesota	314.63		

Electric railways may be divided into four classes: 1, The "overhead system," commonly called the "trolley" system, in which the current for the motor is taken from a wire suspended over and parallel with the tracks. 2, The "third rail system," in which a rail, running parallel, either to one side or between the rails of the track, is the conductor. 3. The "conduit or underground system" in which the conductors are placed in a trench or conduit below ground. 4. The "storage battery system," in which the current is furnished by storage batteries, charged at the power station, and carried on the motor cars. The overhead or trolley system, is the one used almost entirely for electric street cars in the U.S.

The standard overhead system can be described as follows: In addition to the road-bed, rails, and cars common to all street railways, there is a "power plant," at some convenient point on the line, where the steam boilers, engine, and dynamo for generating the electric current, are stationed. The current generated by the dynamo is conducted by a wire to the "main conductor" or "feed wires," which are carried on posts along the street railway line. Over the center of the track, and running par-allel with it, is the "working conductor," or "trolley wire" as it is commonly called. The working conductor is divided into sections, each one or more miles in length, and each station is supplied with currents from the main conductor; thus, a break in any one part of the circuit will not cause any interruption of the circuit. The current on the working conductor or trolley line, is led down to the motor through the trolley, a wheel at the end of a pole which projects upward from the roof of the electric car. The trolley wheel is in continual contact with the trolley wire, and the current passes down the trolley pole by means of a wire to the motor, which is connected by gearing with the axles of the car.

# Electro-Dynamometer

After passing through the motor, the current passes into the wheels of the car, and thence into the track. The rails of the track are connected together with copper wire, furnishing a continuous conductor to lead the current back to the dynamo, thus completing the circuit. In addition to the track connection, the earth is employed as a conductor. At intervals large plates of metal are buried in the wet ground, and wires lead from the rails to the buried plate. Before the current reaches the motor, it passes through the controller which is to the electric car what the throttle valve and reversing lever are to the steam locomotive. The motorman, by moving the handle of the controller starts the car and regulates the speed and shuts off the current. He can also reverse the motor, thus alding the brakes in making an emergency stop. The "third rail" system, in a general way, has much of the construction of the overhead system, but its working conductor is a third rail, placed on insulated supports, which in turn rest on the cross ties. sliding shoe moves with the car over the third rail, and thus "picks up" the current, which then goes through the controller, motor, etc. The modern third rail system had its real beginning on the Intramural railroad of the World's Columbian Exposition in Chicago, 1893. It is intended to be used where electric motors are substituted for steam locomotives. and on railroads whose road-bed is so well protected by fencing or by reason of being elevated that danger due to the electric current is re-duced to the minimum. The most notable instance of the use of the third rail system is the Metropolitan elevated railway in Chicago. It is the first railroad built with the design of using the third rail system.

The underground or conduit system of electric traction employs a trench, channel, or conduit which extends under the tracks. In this conduit the working conductors are laid, and contact is secured either by trolley wheels or a sliding shoe attached to an arm which extends down under the motor car.

The storage battery system employs storage batteries which are carried in the motor car, and which are charged at the power plant of the railway. As yet there is more or less doubt as to the practicability of the storage battery system, but its advocates claim that the plan is feasible and eminently practical. Several lines are operated with storage batteries in the U.S.

Electro-dynamometer, an instrument used for the measurement of electric currents by means of the mechanical forces which they exert upon each other. It contains two coils of wire, one fixed and the other movable; the latter being either larger or smaller than the other so as to be able to pass either outside it or through it. Both coils are in vertical planes and have the same vertical diameter, round which the movable one can revolve so as to set its own plane at an angle with the plane of the other. The terminals of the movable coil dip in cups of mercury, one of which is in connection with one end of the fixed coil, and the

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## Electrolysis

other with one of the binding screws of the instrument. The other binding screw is in connection with the other end of the fixed coil. Hence when the two binding screws are connected with a battery or some other source of electricity, the current has to pass through both coils. Its effect is exhibited by a tendency in the movable coil to set its plane in coincidence with that of the fixed coil, and in such a manner that the current will circulate the same way round both coils. This tendency is resisted by mechanical means provided for the purpose—usually by the torsion of a wire from the end of which the movable coil hangs; and the measurement is usually made by applying torsion until the planes of the two colls are at right angles. The amount of torsion thus applied is proportional to the mutual force exerted by the two coils, and this is proportional to the square of the current, since when we double the current through one we also double the current through the other.

Electrol'ysis, is the chemical decomposition of certain compound bodies under the action of a current of electricity. The following are the main facts to be mentioned. When an electrolyte (as a body capable of electrolytic decomposition is called) is subjected to a current of electricity of sufficient intensity, it is broken up into two elements, which appear, one of them at one electrode and the other at the other electrode; thus, if two platinum plates connected with the first and last plates of a battery be plunged in a trough containing a solution of chloride of silver, the chlorine is given off at the plate by which positive electricity enters, that is, at the plate which is connected with the copper plate of the battery, and the silver is deposited at the plate connected with the zinc plate of the battery. The two elements are liberated at these places in quantities chemically equivalent. Thus for quantities chemically equivalent. Thus for every 103 grams of silver deposited at one side of the vessel 35.5 grams of chlorine are given off at the other side. When a compound consisting of a metallic and a nonmetallic part is decomposed, the nonmetallic part is set free at the electrode at which the current enters and the metallic part at the opposite electrode. Hydrogen acts as a metal. Electrolysis takes place only when the electrolyte is in a liquid state, and involves a transfer of the materials of which the compound is composed from one part of the vessel to another.

The electrolytic action of the current is the same at all parts of the circuit. If the current is made to traverse several vessels, each containing the same substance, all in series (that is, the current that leaves the first entering the second, and so on), it will be found that in each of the cells precisely the same amount of decomposition goes on. There will be the same weight of silver deposited at one side, and the same weight of chlorine set free at the other.

The same quantity of electricity decomposes chemically equivalent quantities of different electrolytes. If we pass the current through a series of cells containing different electrolytes, for example, water, chloride of silver, sulphate of soda, and collect the products of decomposition, we find that the quantities of hydrogen, silver, and sodium set free are strictly proportional to the chemical equivalents of these bodies. Further, in the battery which gives rise to the electric current, if precautions are taken to avoid disturbance by local action on the plates, it is found that the action which goes on in each of its cells is chemically equivalent to that in each of the decomposing cells.

The quantity of the electrolyte decomposed in a given time is proportional to the strength of the current. Currents are often measured in practise by observing the weight of copper deposited in a given time from a solution of sulphate of copper.

Electro-magnet, a piece of iron temporarily converted into a magnet by means of a current of electricity sent through a wire which is coiled round it. The wire is usually covered with silk, cotton, gutta percha. or some other insulator, to prevent the current from leaping across, and to compel it to travel through the whole length of the wire. The more pure and soft the iron is, the stronger will its magnetism be while it lasts, and the more completely will it disappear when the current stops. Steel is less affected than soft iron for the time, but remains permanently magnetized after the current ceases. Electro-magnets are usually much more powerful than other magnets of the same size. The iron which is magnetized by the current passing round it is called the core. It is frequently straight, the wire being wound upon it like thread upon a reel; but very frequently it has the shape of a U, or horseshoe, the wire being coiled round the two ends and the bend of the U left uncovered.

To predict which end will be the north pole, the following rule may be employed: Let the core be a straight bar of iron held in front of you pointing left and right, then if the current ascends on the side next you, and descends on the further side, the north pole is to your left hand the south pole to your right. If the straight bar is then bent into horseshoe shape, its poles will not be changed. There is no necessity to inquire whether the wire forms a right-handed or a left-handed helix, this circumstance having no influence on the question of poles. Indeed, in most cases (just as in the case of thread on a reel) the helices are some right-handed and some left-handed.

An electro-magnet is said to be made when the current is sent through its coil, and unmade when the current is stopped. In some applications of electro-magnets it is necessary to make and unmake them in rapid succession. It is then preferable for the core to consist of a bundle of iron wires rather than of a solid bar.

**Electro-magnetism**, a term that in its broadest sense denotes the science which treats of the relation between magnetism and electricity. In a narrower sense a magnetic effect produced by electricitv is said to be *electro-magnetic*, while an electrical effect produced by the agency of magnets is called *magneto-electric*. In the preceding article we have described

#### Electro-metallurgy

one electro-magnetic effect-the making of an electro-magnet by means of a current. Another important electro-magnetic effect is the deflection of the magnetic needle by a current of electricity passing near it. The simplest experiment to illustrate this action is to take an ordinary mariner's compass, hold just above it a copper wire parallel to the needle of the compass, and then, while the wire is in this position, let its two ends be connected with the two poles of a galvanic battery. The needle will instantly turn away from its north-and-south position, and will remain deflected as long as the current continues to pass over it. If the current flows from south to north, the north end of the needle is turned to the west; and if the current is in the opposite direction, the needle turns the other way. This is the easiest test for determining the direction in which a current is flowing through a wire; and it is the basis of the construction of galranometers, which are the instruments chiefly em-The ployed for the measurement of currents. current tends to make the needle take a position at right angles to the direction of the current; but as the earth tends to make the needle point north and south, the position actually taken is between the two. The fact that a current deflects a needle was discovered by Ersted of Copenhagen, and the general rule for the direction of the deflection was thrown into the following form by Ampère: Imagine the current to enter at your feet and come out at your head, then the north pole of a needle in front of you will be deflected to your left. This rule holds good whether the current is above the needle, below it, or in any other position. The rule may also be put in the following form: Imagine an ordinary screw placed so that the current is in its axis; the north pole of the needle will turn to the same side to which that part of the circumference which is next it turns when the screw advances in the direction of the current.

The leading fact of magneto-electricity is that when a magnet is moved in the neighborhood of a wire or other conductor, the motion causes a current of electricity in the conductor; and a similar effect occurs if the wire is moved while the magnet remains at rest. In the experiment above described, of making a magnetic needle turn on its pivot by sending a current through a wire held above it, the motion of the needle produces for the time being a weakening of the current. If the needle were made by mechanical means to turn the contrary way, it would strengthen the current for the time being. If there were no original current, the turning of the needle to either side by mechanical means would produce a current in the wire. The current thus produced is always opposite in direction to that which would aid the motion.

**Electro-metal'lurgy**, the art of depositing metals from solutions of their salts upon metallic or other conducting surfaces by the agency of an electric current. Its operations may be classified under three heads: the making of facsimiles, the formation of permanent coatings, and the obtaining of a pure metal

from an impure. In every instance the current enters the solution by a plate of the metal in question, which is immersed in it, and leaves the solution by the conducting surface on which the deposit is formed. The plate at which the current enters (called the anode) is gradually dissolved, and an equal quantity of the metal is at the same time deposited on the surface by which the current leaves the solution (called the *cathode*). The source employed for giving the current was formerly a galvanic battery, but is now more frequently a dynamo machine, in which the armature is constructed of much stouter wire than is used in dynamos intended for other purposes. Copper lends itself with special readiness to electrical deposition, and the solution employed for the purpose is usually a saturated solution of sulphate of copper; but if the surface to be coated is of iron, steel, or zinc, it is necessary to employ an alkaline solution, in which cyanide of potassium and carbonate of soda are usually the chief ingredients, a salt of copper being present in comparatively small quantity. For electro-gilding, a solution containing cyanide of potassium and cyanide of gold is employed; and for electro-plating, a solution of cyanide of potassium and cyanide of silver. It so happens that the impurities which usually occur in copper roughly smelted from the ore consist of substances which either cannot be dissolved in a solution of sulphate of copper, or cannot be deposited on a copper surface from such a solution. Hence when a plate of crude copper is used as the anode, pure copper is deposited on the cathode, and most of the impurities fall to the bottom of the vessel. Pure copper is now produced in enormous quantities by the method here described, the purity being a most essential requisite in copper wire for electrical purposes. The most important instance of the deposition of a permanent coating is electrotyping, See Electrotype.

Electrom'eter, an instrument used for accurate electro-statical measurements. Stated in precise technical language, its purpose is to measure the difference of potential between two conductors. Most of the electrometers in actual use are inventions of Sir William Thomson, who was the first to give accuracy to this branch of electrical measurement. His quadrant-electrometer is the instrument chiefly used, and its indications are usually given by means of a small movable mirror which reflects a spot of light from a lamp on to a paper scale. When the two conductors which are tested have the same *potential* the spot of light stands in the middle of the scale, and its movement to either side indicates the difference of their potentials. The instrument is sufficiently delicate to give a sensible displacement when the two conductors are the two plates of a single galvanic cell; and a displacement twice as great will be obtained by combining two such cells.

**Electro-motive Force**, a phrase (commonly abbreviated into the three initial letters e.m. f.) which is of very frequent use in modern

electrical literature, especially in connection with electric currents. The e.m.f. in a wire through which a current is flowing may be compared to the difference of pressures in a long, narrow, horizontal pipe, through which water is flowing. As the difference of the pressure at the two ends of the pipe forces the water through in spite of frictional resistance, so the difference of the *potentials* at the two ends of the wire forces the current through in spite of the electrical resistance of the wire. This difference of potentials is another name for electro-motive force. Each cell of a battery is a source of e.m.f., and when the cells are connected in the usual way (technically called in series) their e.m.f.'s are added together, so that, for example, the e.m.f. of a battery of ten cells is ten times the e.m.f. of one cell. E.m.f. can also be produced in a wire by moving a magnet in its neighborhood and this e.m.f. will be exactly proportional (other things being equal) to the velocity of the motion. The commercial unit of e.m.f. is the coll. Its magnitude may be inferred from the statement that the e.m.f. of a single cell is usually more than one volt, and less than 24 volts. The highest e.m.f. permitted by the Board of Trade in wires which are liable to be touched by the public is about 200 volts. It is no unusual thing for a dynamo to give an e.m.f. of 1,000 or 2,000 volts. Currents produced by a source of high e.m.f. are often called *cur*rents of high tension. They are found to be necessary when several arc lamps are to be supplied in series, and they are also necessary (on the score of economy) when power is desired to be transmitted by electricity to great distances.

**Electro scope**, any apparatus for showing the presence of electricity without giving quantitative measurements. One form consists of two stiff straws loosely tied together at the top, so that they are free to open out at the bottom whenever they repel each other. If they are placed in conducting communication with an electrified body they will open out. A more sensitive instrument is the goldleaf electroscope. Here the two gold leaves diverge under the influence of an electrified body held over the instrument. The gold leaves are attached to the lower end of a short rod of brass, whose upper end carries the brass knob which forms the top of the instrument. These metal parts are supported by the glass shade which insulates them from the earth, and the upper part of which is coated with varnish, but this is not essential. The two gold leaves originally hang down parallel, and nearly touching each other. When an electrifled body is slowly brought down over the knob from a good height above it, the unlike electricity is attracted to the knob, and the like electricity is repelled into the gold leaves, which, in consequence of being thus electri-fled, repel each other. The two little brass columns standing up from the base are in connection with the earth, and their presence increases the divergence of the leaves. As soon as the electrified body above is removed, the leaves

come together again. If, however, while the leaves are standing apart under the influence of the body overhead, the knob is touched with the finger, the leaves will instantly come together. It will then be found that either lowering or raising the influencing body causes them to open out again; and if the influencing body is removed they will open out to the same width at which they stood just before the knob was touched. The leaves and knob have now a charge opposite to that of the influencing body, and the electroscope can now be used to show whether the charge of a second influencing body is positive or negative. If the second body has the same kind of electricity as the first, it will diminish the repulsion; if it has the opposite kind, it will increase the repulsion.

Electrotyping consists in making a solid plate of metal by use of a mold and galvanic action, and is performed as follows: A form of type or wood cut is cleansed and dusted with finely powdered plumbago. A type form is laid face upward on a powerful press, a sheet of beeswax upon a lead plate is placed on top of the form and an impression taken in the press. The wax mold so formed is coated with powdered lead (plumbago) to give it a surface for the galvanic current. After the loose particles of lead are blown off, it is washed with a weak solution of sulphate of copper, then dusted with iron filings. It is then suspended in a bath consisting of two parts of sulphate of copper and one part of sulphuric acid placed in the water in the tub. The wax plate is then connected with the negative pole of a battery, and a sheet of copper is hung in front of the wax and connected with the positive pole. The current is then turned on, and the copper is drawn from the plate and deposited upon the wax mold. After several hours it is removed from the bath and the shell of copper is taken from the wax. It is then "backed up" with lead or type metal, planed smooth when cold, the edges finished, and it is ready for the press. The plate when complete is about onesixth of an inch thick. When placed on the spress these plates are mounted upon a block with rachets on the side and foot which make them type high. Electrotype copies of steel engravings are made in practically the same manner as described above. Great care has to be taken, however, in preparing a steel plate so that the copper will not adhere to it.

El'ements, the simplest constituent principles or parts of anything; in a special sense, the ultimate indecomposible constituents of any kind of matter. In ancient philosophies the term was applied to fire, air, earth, and The mediæval chemists, however, abwater. sorbed in the study of metals and mineral substances, supposed that the metals consisted of an elemental sulphur and an elemental mercury mixed together more or less perfectly and in different proportions. To these were subsequently added salt and some others, so that about the middle of the seventeenth century the first principles amounted to five, divided into two classes: the active, consisting of mercury or spirit, sulphur or oil, and salt;

## Elephant

and the passive, consisting of water or phlegm, and earth or the terrestrial part. The names remained, not so much as denoting substances or ultimate principles as gradually coming to denote functions; the first great modification being the expansion of the idea of elemental sulphur into phlogiston by Stahl, as the result of which the adherents of the phlogistic theory applied the term to phlogiston, to the gases then discovered, the mineral, vegetable, and animal acids, the alkalies, earths, and metallic calces, oil, alcohol, and water. The substances considered as simple naturally changed with the change of theory introduced by Lavoisier. who considered as elements, oxygen, nitrogen, hydrogen, sulphur, phosphorus, and carbon, the metals and the earths, and, as Boyle had already suggested, practically defined an element as a body not yet decomposed, the definition now commonly adopted.

El'ephant, the popular name of a genus or subfamily of fivetoed proboscidian mammals, usually regarded as comprehending two species, the Asiatic and the African.



Tips of Trunks of (a) African and (b) Indian Elephants.

From a difference in the teeth, however, the African species is sometimes treated as a distinct genus, and some authors divide the Asiatic elephants into several species, such as the Indian elephant, the Ceylon elephant, and the Sumatra elephant. The so-called white elephants are merely albinos. The African elephant is distinguished from the Asiatic species by its greater height, its larger ears, its less elevated head and bulging or convex forehead, the closer approximation of the roots of the tusks, and the greater density of the bone. It has also only three external hoofs on the hind feet, while the Asiatic has four. All elephants are remarkable for their large, heavy, short bodies sup-ported on columnar limbs, a very short neck. a skull with lofty crown and short face bones. with the exception of the premaxillaries, which are enlarged to form tusk-sockets. To compensate for the short neck, they have the long proboscis, often 4 or 5 ft. in length, produced by the union and development of the nose and upper lip. It is made up of muscular and membranous tissue, the only cartilages being the valves at the entrance of the nares. The trunk is of great strength and sensibility, and serves alike for respiration, smell, taste, suction, touch, and prehension. The tusks, which are enormously developed upper incisor teeth, are not visible in young animals, but in a state of maturity they project, in some instances ? or 8 ft. The largest on record (possibly that of an extinct species) weighed 350 lbs. Elephants sometimes attain the height of 15 ft.. but their general height is about 9 or 10. Their weight ranges from 4,000 to 9,000 lbs. The female is gravid twenty months, and sel-

# Elephant

dom produces more than one at a birth; this, when first born, is about 3 ft. high, and continues to grow till it is 16 or 18 years of age. It is said they live to the age of 100 years and upward. They feed on vegetables, the young shoots of trees, grain, and fruit. They are polygamous, associating in herds of considerable size under the guidance of a single leader. An elephant leaving or driven from a herd is not allowed to join another, but leads a solitary, morose, and destructive life. These are popularly known as "rogues." Elephants are caught either singly or in herds. In the for-mer case it is necessary to catch adroitly one of the elephant's legs in the noose of a strong rope, which is then quickly attached to a tree; another leg is then caught until all are securely His captors then encamp beside fastened. him, until under their treatment he becomes tractable. When a number are to be caught a strong enclosure is constructed, and into this the elephants are gradually driven by fires,



Heads of (A) African and (B) Indian Elephants.

noise, etc. With the aid of tame elephants the wild ones are tied to trees and subjected to the taming process. The domesticated elephant requires much care, and a plentiful supply of food, being liable to many ailments. The daily consumption of a working elephant is, according to Sir J. E. Tennent, 2 cwts. of green food, about half a bushel of grain, and about 40 gallons of water. Their enormous strength, docility, and sagacity make them of great value in the East for road making, build-ing, and transport. They are used by the great on occasions of pomp and show, being often richly caparisoned, and bearing on their back a howdah containing one or more riders, be-sides the mahout or driver sitting on the animal's neck. Tiger shooting is often practised from an elephant's back. The fossil remains of the genus Elephas indicate the former existence of at least 14 species; and a still larger number of species belong to the allied genus Mastodon. The smallest full-grown elephant on record is a dwarf elephant, named Lili, from Sumatra. It is 36 in. high and weighs 172 pounds.

### **Eleusinian Mysteries**

**Elephan'ta**, a small island in the Bay of Bombay. It is celebrated for its rock temples or caves, the chief of which is a cave temple supposed by Fergusson to belong to the tenth century, 130 ft. long, 123 broad, and 18 high, supported by pillars cut out in the rock, and containing a colossal figure of the trimurti, or Hindu trinity, Brahma, Vishnu, and Siva. This temple is still used at certain Hindu festivals.

**Elephant Fish**, a fish of the order Elasmobranchii (rays and sharks), so named from a proboscis-like structure on the nose; called also southern chimæra. It inhabits the Antarctic seas, and is palatable eating.

**Eiephanti ne, a** small island of Egypt, in the Nile, opposite Assouan (Syene). It is covered with ruins piled upon each other,— Egyptian, Roman. Saracen, and Arabic,—the most important being a gateway of the time of Alexander, a small temple dedicated to Khnum and founded by Amenophis III, and the ancient Nilometer mentioned by Strabo. **Elephant Seal** (the Proboscis Seal, or Sea

**Elephant Seal** (the Proboscis Seal, or Sea elephant), the largest of the seal family. There are probably two species, one found only on the coast of California and Western Mexico, the other in Patagonia, Kerguelen Island, Heard's Island, and other parts of the Southern seas. They vary in length from 12 to 30 ft., and in girth at the chest from 8 to 18 ft.



Elephant Seal.

The proboscis of the male is about 15 inches long when the creature is at rest, but clongates under excitement. The females have no proboscis, and are considerably smaller than the male. Both species are becoming rare from their continual slaughter.

their continual slaughter. **Elephant's Foot**, the popular name of a plant of the natural order Dioscoreaceæ, distinguished by the shape of its root stock, which forms a nearly hemispherical mass rising a little above the ground, covered with a thick corky bark. It has a slender climbing stem growing to a length of 30 or 40 ft., with small heart-shaped leaves and greenish-yellow flowers.

**Eleusinian Mysteries,** the sacred rites anciently observed in Greece at the annual festival of Dēmētēr, or Ceres, so named from their original seat Eleusis. As a preparation for the greater mysteries celebrated at Athens and Eleusis, lesser Eleusinia were celebrated at Agræ on the Ilissus.

**Eleu' thera,** one of the largest of the Bahama Islands. It is of very irregular shape, its length being about 70 mi., and its breadth in general from 2 to 4 mi., though in one part 10. Pop. over 5,000.

El'evator, 1, a mechanical contrivance consisting of a series of boxes or buckets attached to a belt traveling round two drums, one above and one below, for hoisting grain, meal, etc., into a mill or storehouse from a ship's hold, etc. In the U. S. large buildings containing such contrivances, and in which grain is stored, receive the same name. 2, An apparatus for raising or lowering persons or goods to or from different levels in warehouses, hotels, etc., consisting usually of a cage or movable platform.

Elgin, Kane co., Ill., on Fox River, 38 mi. n.w. of Chicago. Railroads: C. & N. W.; C M. & St. P.; Elgin, Joliet & Eastern. Industries: watch works, flouring mill, iron foundry, shoe, silver plate, condensing, watch case, and a number of other factories. Surrounding country dairy. Illinois Hospital for Insane located here. The town was first settled in 1835 and became a city in 1854. Pop. est. 1807, 22,000.

Eigin Marbles, the splendid collection of antique sculptures brought chiefly from the Parthenon of Athens to England by the seventh earl of Eigin (1766-1841) in 1814, and afterward purchased by Parliament for the British Museum at a cost of \$175,000 (less than half what had been expended on them). They consist of figures in low and high relief and in the round, representing gods, goddesses, and heroes; the combats of the Centaurs and Lapithæ; the Panathenaic procession, etc. They exhibit Greek sculpture at its highest stage, and were partly the work of Phidias.

Ell, one of the Hebrew judges, the predecessor of Samuel. He was high-priest and judge for forty years. His two sons having been slain and the ark taken in battle by the Philistines. the news proved so severe a shock that he fell and broke his neck, at the age of ninety-eight.

**Eli'jah**, the most distinguished of the prophets of Israel, flourished in the ninth century B. C., during the reigns of Ahab and Ahaziah, and until the beginning of the reign of Jehoram, his special function being to denounce vengeance on the kings of Israel for their apostasy. Elijah at length ascended to heaven in a chariot of fire, Elisha, his successor, being witness.

Eliot, CHARLES WILLIAM, educator, b. in Boston, Mass., in 1834. In 1853 he graduated at Harvard College, and in the following year was appointed tutor in mathematics at his Alma Mater. He was made assistant professor in mathematics and chemistry in 1858. He taught chemistry in Lawrence Scientific School in 1861. In 1863 he went to Europe, where he studied chemistry. On his return in 1865 he became professor of chemistry in the Massachusetts Institute of Technology. He

was elected president of Harvard University in 1869, which position he still holds. He has done considerable to advance the cause of higher education. He is a fellow of the American Academy of Sciences and has been mad-LL.D. by Williams, Princeton, and Yale. He wrote a standard Manual of Qualitative Chemical Analysis, published in 1869.

El'iot, GEORGE (1820-1880), the assumed literary name of Mary Ann, or, as she preferred to write the name in later years, Marian Evans. English novelist. She was the daughter of a Warwickshire land agent and surveyor, and was b. at Griff, near Nuneaton. She received at Coventry an excellent education. Her first literary undertaking was the completion of Mrs. Hennell's translation of Strauss's Life of Jesus (1846). After spending two years abroad she boarded at the house of John Chapman. editor of the Westminster Review, of which she became sub-editor. It was not, however, until January, 1857, that she came prominently into public notice, when the first of a series of tales entitled Scenes from Clerical Life appeared in Blackwood's Magazine. The series came to an end in November, 1857, and in the following year the publication of Adam Bede placed her in the first rank of writers of fiction. It was succeeded by the Mill on the Floss, Silas Marner. Romola, Felix Holl, Middlemarch, and Daniel De-ronda. In addition to those prose works she published three volumes of poems, The Spanish Gypsy, Agatha, and the Legend of Jubal. Her last work published during her life was the series of essays entitled The Impressions of Theophrastus Such. In May, 1880, she married Mr. John Cross, but did not survive the marriage many months, dying rather suddenly at Chelsea

El'iot, JOHN (1604-1690), "the apostle to the Indians," was b. in England, and graduated at Cambridge University. In 1631 he removed to Boston. In 1632 he connected himself with a church at Roxbury, Mass., which connection was not severed until a short time before his death. He learned the language of the Indians. and devoted himself to improving their condition. He translated the Bible into the Indian tongue, and published an Indian grammar. He died at Roxbury, Mass.

Ell'sha, a Hebrew prophet, the disciple and successor of Elijah. Many miracles of prediction and cure, and even of raising the dead. are ascribed to him, but his figure is less original and heroic than that of his master. He held the office of prophet for fully sixty-five years, from the reign of Ahab to that of Joash.

Elix'ir, a word of Arabic origin, applied by the alchemists to a number of solutions employed in attempting the transmutation of metals into gold, and also to a potion, the *elixir vita*, or elixir of life, supposed to confer immortality. It is still used for various popular remedies, for the most part composed of various aromatic and stimulative substances held in solution by alcohol.

Elizabeth (1533-1603), queen of England, daughter of Henry VIII and of Anne Boleyn, was b. at Greenwich, and almost immediately

declared heiress to the crown. After her mother had been beheaded (1536) both she and her sister Mary were declared bastards, and she was finally placed after Prince Edward and the Lady Mary in the order of succession. On the accession of Edward VI Elizabeth was committed to the care of the queen-dowager Catherine; and after the death of Catherine and beheadal of her consort, Thomas Seymour, she was closely watched at Hatfield, where she received a classical education under William Grindal and Roger Ascham. At the death of Edward, Elizabeth vigorously supported the title of Mary against the pretensions of Lady Jane Grey, but continued throughout the whole reign an object of suspicion and sur-In self-defense she made every veillance. demonstration of zealous adherence to the Roman Catholic faith, but her inclinations were well known. On Nov. 17. 1558, Mary's reign came to a close, and Elizabeth was immediately recognized queen by Parliament. The first great object of her reign was the settlement of religion, to effect which a Parliament was called on January 25, and dissolved on May 8, its object having been accomplished. The nation was prepared for a return to the Reformed faith, and the Parliament was at the bidding of the court. The ecclesiastical system devised in her father's reign was re-established, the royal supremacy asserted, and the revised prayer book enforced by the Act of Uniformity. Elizabeth's first Parliament approached her on a subject which, next to religion, was the chief trouble of her reign, the succession to the crown. They requested her to marry, but she declared her intention to live and die a virgin. With the unfortunate Mary, Queen of Scots, were connected many of the political events of Elizabeth's reign. On her accession the country was at war with France. Peace was easily concluded (1559); but the assumption by Francis and Mary of the royal arms and titles of England led to an immediate interference on the part of Elizabeth in the affairs of Scotland. She entered into a league with the Lords of the Congregation, or leaders of the Reformed party; and throughout her reign this party was frequently serviceable in furthering her policy. She also gave early support to the Huguenot party in France, and to the Protestants in the Netherlands, so that throughout Europe she was looked on as the head of the Protestant party. The detention of Mary in England (1568-87), whither she fled to the protection of Elizabeth, led to a series of conspiracies, beginning with that under the earls of Northumberland and Westmoreland, and ending with the plot of Babington, which finally determined Eliza-beth to make away with her captive. The state of France consequent on the accession of Henry IV, who was assisted by Elizabeth, obviated any danger from the indignation which the deed had caused in that country; and the awe in which King James stood of Elizabeth, and his dread of interfering with his own right of succession to England, made him powerless. But Philip was not to be so appeased, the execution of Mary lending edge to other grievances. The fleets of Elizabeth had galled him in the West Indies, her arms and subsidies had helped to deprive him of the Netherlands; the Armada was already in preparation. Accordingly he called the Queen of England a murderess, and refused to be satisfied even with the sacrifice she seemed to be prepared to make of her Dutch allies. The Armada sailed on May 29, 1588. Its fate is too well known to need recapitulation. The war with Spain dragged on till the close of Elizabeth's long reign. During her reign the splendor of her government at home and abroad wassustained by such men as Burleigh, Bacon, Walsingham, and Throgmorten.

Eliz' abethan Architecture, a style of architecture which prevailed in England during the reigns of Elizabeth and James I. It succeeded to the Tudor style, properly so called, with which it is sometimes confounded. The Elizabethan is a mixture of inferior Gothic and debased Italian, producing a singular heterogeneousness in detail, with, however, wonderful picturesqueness in general effect, and domestic accommodation more in accordance with the wants of an advancing civilization than was afforded by the styles which preceded it. The chief characteristics of Elizabethan architecture are: windows of great size both in the plane of the wall and deeply embayed, ceilings very richly decorated in relief, galleries of great length, very tall and highly-decorated chimneys, as well as a profuse use of ornamental strap work in the parapets, window heads, etc.

**Elizabeth Islands**, a group of sixteen American islands south of Cape Cod, with a permanent pop. of about 100.

**Elizabeth Petrovna**, empress of Russia (1709-1762), daughter of Peter the Great and Catharine, ascended the throne in 1741, as the result of a conspiracy, in which Ivan VI, a minor, was deposed. She was a patron of literature, founded the University of Moscow, and corresponded with Voltaire.

**Elizabeth**, Union co., N. J., on Staten Island Sound, 5 mi. s.e. of Newark. Railroads: Pennsylvania, Central New Jersey, Lehigh Valley, and B. & O. Industries: Sewing machine, several iron foundries, car works, copper works, wire works, two shipyards, fertilizing and oil works. Surrounding country agricultural. It is the site of one of the battles of the Revolutionary War (1780), and was the point of exchange of prisoners during that period. The town was first settled in 1600 by Dutch and English in the employ of East India Co., and became a city in 1866. Pop. est. 1897, 46,000. **Elizabeth Stuart**, queen of Bohemia (1506-

Elizabeth Stuart, queen of Bohemia (1500-1662), daughter of James I of England and VI of Scotland. By her daughters, Elizabeth, Charlotte, and Sophia, she was the ancestress of Louis Philippe and of George I, and her sons, Rupert and Maurice, became famous Cavalier leaders.

**Elizabeth**, queen of Roumania, was b. in Germany, Dec. 29, 1843. She married King (then prince) Charles of Roumania.

Eik (Moose, or Moose Deer), the largest of the deer family, a native of Northern Europe, Asia, and America. The elk or moose has a



short compact body, standing about 6 ft. in height at the shoulders, a thick neck, large clumsy head, and horns which flatten out almost from the base into a broad palmate form with numerous snags. In color the elk is grayish brown, the limbs, sides of head, and coarse mane being, how-

Head of Elk.

Head of Elk. ever, of a lighter Their flesh resembles beef rather than hue. venison. For the most they are inoffensive, and so exceedingly wary that they are approached only with difficulty. The Indians and half-breeds are the most skillful moose hunters. The moose has a wide range in Canada. extending from the Arctic Ocean and British Columbia to New Brunswick and Nova Scotia; and it is found also in Maine. It feeds largely on the shoots of trees or shrubs, such as the willow and maple, and on bark, etc.

Elk, Irish, a large deer found in the Pleistocene strata, and distinguished by its enormous antlers, the tips of which are sometimes 11 ft. apart. Though a true deer, its antlers differ from those of living species in that the beam is flattened into a palm. To sustain the great weight, unusually large and strong limbs and neck vertebræ were required. Its remains are found not only in Ireland, but in Scotland and England, and on the Continent, where they occur in lacustrine deposits, brick clay, and ossiferous caves.

Elkhart, Elkhart co., Ind., on St. Joseph and Elkhart rivers, 100 mi. e. of Chicago. Railroads: Big Four, Elkhart & Western, L. S. & M. S. Industries: three flouring mills, iron foundry, paper, brass novelty, band instrument factories, and carriage and harness manufacturing. The surrounding country is agricultural. Elkhart was first settled in 1831, and became a city in 1875. Pop. est. 1897, 14,000

Elkins, STEPHEN B., secretary of war, was b. in Perry co., O., Sept. 26, 1841. In New Mexico had extensive business interests; after-ward in West Virginia. Appointed secretary of war in 1891. In 1894 he was elected U.S. senator.

Ellery, WILLIAM (1727-1820), b. in Newport, R. I.; was one of the signers of the Declaration of Independence. He served several years in the Continental Congress, and for thirty years was collector of Newport. His son Frank rose to the rank of commodore in the navy

Ellipse', a figure in geometry ranking next in importance to the circle, and produced

when any cone is cut by a plane which passes through it not parallel to nor outting the base. Kepler discovered that the paths described by the planets in their revolutions round the sun are ellipses, the sun being placed in one of the foci.

Ello'ra (or Elo'ra), a ruinous village, Hin-dustan, Deccan, Nizam's Dominions, 13 mi n.w. of Aurangabad, famous for its rock and cave temples excavated in the crescent-shaped scarp of a large plateau.

Ellsworth, EPHRAIM E. (1837-1861), American soldier. He was commissioned colonel of a company of zouaves, which he organized, and which enlisted on the Union side at the outbreak of war in 1861. He tore down a Confederate flag from the roof of a hotel at Alexandria, and while descending from the roof was shot dead by the proprietor, Jackson, who was

immediately killed by a soldier. Ellsworth, OLIVER (1745-1807), American statesman, b. in Conn. He distinguished himself in state affairs and in the Continental Congress, and was a member of the convention which drafted the Constitution of the U.S. In 1789 he was elected U.S. senator from Connecticut and was chairman of the committee which organized the federal judicial system. He was chief justice of the U.S. supreme court (1796-1799), and, later, together with Patrick Henry and Governor Davie, negotiated a treaty with France. He became prominent in state affairs and in the Continental Congress. and was a member of the federal convention of 1787 which prepared the Constitution of the U.S. It was on his motion that the words "National government" in that organic act were replaced by the definition "Government of the United States." Ellwood, THOMAS (1639-1713), an early writer

among the Quakers. About 1660 he was induced to join the Society of Friends, and soon after published a book entitled An Alarm to the Priests. He was imprisoned on account of his religion, but subsequently became reader to Milton, and is said to have suggested to him the idea of writing the Paradise Re-gained. In 1705 and 1709 he published the two parts of his Sacred History. His works include a poetical life of King David, the Davideis.

Ellsworth, Hancock co., Me., on Union River, 20 mi. s.e. of Bangor. Railroad: Maine Central. Industries: shoe factory, iron foundry. wooien mill, lumber mills, and ship yards. Surrounding country agricultural and granite. The town was first settled in 1763 and became a city in 1868 or 1869. Pop. est. 1897, 5,000.

Elm, a genus of trees, consisting of thirteen species, all natives of the northern temperate zone. They have bisexual flowers with a campanulate calyx, as many stamens as there are divisions in the limb of the calyx, and two styles. The common elm is a fine tree, of rapid and erect growth, and yielding a tall stem, remarkable for the uniformity of its diameter throughout. It is very common as a timber tree in England; but as it rarely produces seed it is questionable whether it is in-



It is a native of the south and digenous. middle of Europe, and the west of Asia. The average height of a mature tree is 70 or 80 ft., but some reach 150 ft. The wood is brown, hard, of fine grain, not apt to crack, and is used for many purposes. The tree generally attains maturity in 70 or 80 years. The moun-tain elm, a native of Scotland, grows to a less height than the English elm, is of slower growth, and yields a much shorter bole, but it is far bolder in its ramification and more It usually attains to the height of hardy. about 50 ft. It does not produce suckers, like the English elm, but yields seed freely. The timber is strong and elastic, and the tree often yields large protuberances of gnarled wood, finely knotted and veined, and much esteemed for veneering. The smooth-leaved elm first appeared about the middle of last century. The most ornamental tree of the genus is the weeping elm. The American or white elm is abundant in the Western states, attaining its



Common Eim. a.-flower; b.-fruit.

loftiest stature between lat. 42° and 46°; here it reaches the height of 100 ft., with a trunk 4 or 5 ft. in diameter, rising sometimes 60 or 70 ft. before it separates into a few primary Its wood is not much esteemed. The limbs. red or slippery elm is found over a great extent of country in Canada, Missouri, and as far south as lat. 31°; it attains the height of 50 or 60 ft., with a trunk 15 or 20 in. in diam-eter; the wood is of better quality than that of the white elm. The leaves and bark yield an abundant mucilage. The wahoo, inhabiting from lat. 37° to Florida, Louisiana, and Arkansas, is a small tree, 30 ft. high. The branches are furnished on two opposite sides with wings of cork 2 or 3 lines wide; the wood is finegrained and heavy.

**Elmira**, Chemung co., N. Y., on Chemung River, 275 mi. w. of New York, and 150 mi. e. of Buffalo. Railroads: Erie: Delaware, Lackawanna & Western; and Lehigh Valley & Northern Central (Pa.). Industries: bicycle factory, boots and shoes, bridge works, glass works, and numerous others. Surrounding country agricultural. Elmira is the birthplace of Senator David B. Hill. The town was first settled about 1790, and became a city in 1864. Pop. est. 1897, 37,000.

**Elmo's Fire,** ST., a meteoric appearance often seen playing about the masts and rigging of ships. If two flames are visible (Castor and Pollux) the sailors consider it a good omen; if only one (Helena), they regard it as a bad one.

El Paso, El Paso co., Tex., on Rio Grande River, 300 mi. w. of Dallas. Surrounding country agricultural and mineral. Railroads: G. H. & S. A.; A. T. & S. F.; Mexican Central; R. G. S. M. & P.; Southern Pacific; and Texas Pacific. Industries: large smelting furnaces, cigar factories, brick, tile, shingle and mattress factories. The town was first settled in 1850 and became a city in 1880. Pop. est. 1897, 15,500.

Ely, Richard THEODORE, political economist, b. in 1854 at Ripley, N. Y. He was educated at Dartmouth and Columbia colleges, and at the University of Heidelberg, Germany. From 1885 to 1892, he was professor of political economy at Johns Hopkins University. Later he filled the same chair in the University of Wisconsin, a position which he continues to hold. His writings are condemned by some on account of their socialistic tendencies. This criticism, however, was not considered just by the board of regents of the university, and he was officially exonerated from the accusation. Among his more important works are: French and German Socialism; The Labor Times; Recent American Socialism; The Labor Movement in America, Cooperation in America; Problems of To-day; and Outlines of Economics.

Ely, IsLE OF, a district in England, in the county of Cambridge, separated on the south by the Ouse from the remaining portion of the county. It is about 28 mi. long by 25 mi. broad; area 227,326 acres.

Elyria, Lorain co., O., 25 mi. w. of Cleveland. Railroads: Lake Shore and Michigan Southern. Manufactures: grindstones and tobacco. Pop. est. 1807, 6,100.

**Elys'ium** (Elysian Fields), among the Greeks and Romans the regions inhabitated by the blessed after death. They are placed by Homer at the extremities of the earth, by Plato at the antipodes, and by others in the Fortunate Islands (the Canaries). They were at last transferred to the interior of the earth, which is Vergil's notion.

**El'zevir** (or Elzevier), the name of a family of publishers and printers, residing at Amsterdam and Leyden, celebrated for the beauty of the editions of various works published by them, principally from 1595 to 1680.

**Emanation**, in a specific sense, an idea at the center of many philosophic systems which seek to explain the universe as an eternal efflux or emanation from the Supreme Being, comparable with the efflux of light from the sun. Traces of the doctrine are found in the system of Zoroaster. It had a powerful influence on the ancient Egyptian and Greek philosophy. **Emancipation Proclamation** was issued by President Lincoln, Jan. 1, 1863, "as a fit and necessary war measure for suppressing rebellion." It freed all slaves in any states and portions of states actually in rebellion, and which were unrepresented in Congress, or not in possession of the Union armies.

Éman 'uel the Great (1471-1521), king of Portugal, ascended the throne in 1495. During his reign were performed the voyages of discovery of Vasco de Gama, of Cabral, of Americus Vespucius; and the heroic exploits of Albuquerque, by whose exertions a passage was found to the East Indies, the Portugal dominion in Goa was established, the Brazils, the Moluccas, etc., were discovered. The commerce of Portugal, under Emanuel, was more prosperous than at any former period. The treasures of America flowed into Lisbon, and the reign of Emanuel was justly called "the golden age of Portugal."

**Embaiming** (em-bäm'ing), the process of filling and surrounding with aromatic and antiseptic substances any bodies, particularly corpses, in order to preserve them from corruption. The ancient Egyptians employed the art on a great scale, and other peoples, for example the Assyrians and Persians, followed them, but by no means equaled them in it.



Egyptian Mummy.

The ancient Peruvians appear to have injected and washed the corpses with the fluid that flows from imperfectly burned wood, which would of course contain pyroligneous acid, creosote, and other antiseptics. Pliny alludes to the use of a similar fluid by the Egyptians for embalming. In later times bodies have been preserved a long time by embalming, especially when they have remained at a low and uniform temperature, and have been protected from the air. Of the various modern artificial means of preserving bodies, impregnation with corrosive sublimate appears to be one of the most effective, next to immersion in spirits. An injection of sulphate of zinc into the blood vessels is said to be very effective.

**Emberiz** idæ, a family of small birds belonging to the order Insessõres and tribe Conirostres, typical genus *Emberiza*. It includes the buntings, the snow-flake, the yellow-hammer, and reed sparrow. The ortolan belongs to this family. By some naturalists they are classified as a subfamily of the finches.

**Em blements**, in law, the crops actually growing at any time upon land. They are considered in law as personal property, and pass as such to the executor or administrator of the occupier, if the latter die before he has actually cut, or reaped, or gathered the same.

**Embroid ery**, figured work in gold, or silver, or thread silk, wrought by the needle, upon cloths, stuffs, or muslins. In embroidering stuffs a kind of stretching-frame is used, because the more the piece is stretched the

easier it is worked. The art was common in the East in very ancient times. The Jews appear to have acquired it from the Egyptians; Homer makes frequent allusion to it; and Phrygia was celebrated for its embroidery, which was in great demand at Rome. The Anglo-Saxons had a continental reputation, and from the eleventh to the sixteenth century the art of pictorial needlework was of the highest importance both as a recreation and as an industry. Embroidery is commonly divided into two classes: white embroidery applied to dress and furniture, in which the French and the Swiss excel; and embroidery in silk, gold, and silver, chiefly in demand for ecclesiastical vestments, etc. The Chinese, Hindus, Persians, and Turks excel in work of this kind.

**Embryology** is that division of Anatomy which treats of the growth of the fertilized ovum. The portion of life history considered under *Embryology* is limited in placental mammals to a period extending from the moment of conception to the moment in which the anatomical connection between mother and young is terminated. While the limitation seems natural enough, it is open to the following objections:—

I. In many animals, most fishes for example, there never is any anatomical union between parent and embryo, and the embryonic period must be otherwise estimated; this tendency to lead an independent existence is often carried to the point when even fertilization of the ovum takes place outside the female.

2. In other animals, such as birds and reptiles, while the ovum remains for some time after fertilization within the maternal body. it exists independently except as it profits by the maternal heat and protection. This internal incubation usually becomes shortly external, and the mother continues to warm and protect the egg until the young animal bursts open the shell and ceases to exist as an embryo

3. Many processes, embryonic or developmental in their character, are continued after birth (e. g., formation of bone in cartilage. maturation of the genital organs, eruption of the teeth, etc.) coincidently with processes which result simply in growth, or increase in bulk or weight, so that the embryonic existence of the individual cannot be said truly to stop at birth. Furthermore, though the higher mammals cease at birth to maintain their young through a placenta, yet for a variable time thereafter the physiological union between mother and offspring continues to be nearly as intimate as before, by virtue of the helplessness of the young and the lacteal function of the mother. The student, therefore, of Philosophical Anatomy, will see in the act of parturition (childbirth) merely one epoch in the life history of an individual, which commences with the fertilization of the ovum and terminates only when the process of evolution is checked by death. To properly appreciate the manifold changes seen in watching the development of various species from ovum to adult, it must be constantly borne in mind that it is only through

such changes (often startling in abruptness and radical in character; as, e.g., in the changes in the larva to the pupa and imago in certain insects, or from mysis to zooea in crustacea) that the embryo can conquer the vicissitudes of environment and attain to adult existence.

Two laws form the basis of modern Embryology: 1, Virchow's Law-Omnis cellula e cellulo; which affirms that all organic life (a union of organs composed of cells) originates in the cell and becomes complex through cell division and cell specialization (or physiological division of labor); 2, Von Baer's Lawthe individual in developing assumes at first a generalized form common to many types, but, proceeding, becomes more and more specialized, and less and less like parallel types until finally the completed individual stands alone. Development is from the general to the special, from the homogeneous to the heterogeneous. The evolutionary hypothesis sees in successive stages of the developing embryo dim adumbrations of long extinct ancestors, otherwise unrepresented and forgotten. "Ontogeny, or the development of the individual is a recapitulation of phylogeny, or the evolution of the race." While we may not see in this doctrine of recapitulation (Haeckel) a literal statement of the unfolding of every embryo, it is certain that at successive stages of embryonal life the human foetus (for example) assumes conditions and forms bearing strong resemblances to the embryo or adults of lower forms of life. In this connection also it is proper to refer to the rival theories of Evolution and Epigenesis; the former doctrine originated in its crudest form by the ancients, and in our time revived with great subtilety by Weissmann, holding that the embryo exists preformed in the smallest ovum and requires only fecundation to cruse it to unfold into the adult; the latter, first held by Wolff, and now most generally adopted, contending that the growth of the embryo is a process of new formation, organs arising de novo through the stimulus upon the cell mass of conditions at present largely un-known. W. H. ALLPORT.

Em'eraid, a well-known gem of pure green color, somewhat harder than quartz. It is a silicate of aluminum and the rare element glucinum or beryllium, which was detected in it by Vanquelin after it had been discovered by the same chemist in the beryl. Its color is due to the presence of chromium. Its natural form is either rounded or that of a short sixsided prism. It is one of the softest of the precious stones, but is not acted on by acids. Emeralds of large size and at the same time free from flaws are rare; the largest on record is said to have been possessed by the inhabit-ants of the valley of Manta in Peru when the Spaniards first arrived there. It was as big as an ostrich egg, and was worshiped as the mother of emeralds. The ancients, who valued them, especially for engraving, are said to have procured them from Ethiopia and Egypt. The finest are now obtained from Colombia. The Oriental emerald is a variety of the ruby, of a green color, and is an extremely rare gem.

**Emeraid Green** (known also as Schweinfurth green, and by a great number of other names), a vivid, light green pigment, prepared from arseniate of copper, and used both in oil and water-color painting. It is extremely poisonous.

Em'erson, RALPH WALDO (1803-1882), poet and prose writer, b. at Boston. He graduated at Harvard in 1821, for five years taught school, and in 1829 became minister of a Unitarian church in Boston, but in 1832 resigned his charge. He spent the greater part of 1833 in Europe, where he made the acquaintance of Walter Savage Landor, Wordsworth, and Carlyle; and on his return began his career as a lecturer on various subjects, in which capacity he acted for a long series of years. In 1835 he took up his permanent residence at Concord, Mass., and in 1836 published a small volume called Nature. He was one of the original editors of the Dial, a transcendental magazine begun in 1840. Two volumes of his essays were published in 1841 and 1844, and his poems in 1846. His miscellaneous addresses had been published in England in 1844, and on visiting Great Britain in 1847 he was welcomed by a large circle of admirers. In 1850 he published Representative Men; in 1856, English Traits; in 1860, The Conduct of Life; in 1869, May Day and Other Poems, and Society and Solitude; in 1871, Parnassus, a collection of poems; in 1876, Letters and Social Aims. Emerson showed cer-tain similarities with Carlyle, of whom he was a friend and correspondent. Their correspondence appeared in 1883. He also numbered among his associates Bronson Alcott, Thoreau, Ellery Channing, and Margaret Fuller. He was one of the most original and influential writers the U.S. has produced.

Em'ery, an impure variety of corundum, of blackish or bluish-gray color, chiefly found in shapeless masses and mixed with other minerals. It contains about 82 per cent. of alumina, and a small portion of iron; is very hard; is infusible, and is not attacked by acids. The best emery is brought from the Levant. chiefly from Cape Emeri in Naxos. It also occurs in Spain. It is employed in cutting and polishing precious stones; in smoothing the surface of the finer kinds of lenses preparatory to their being polished; in the polishing of marble; by cutlers, locksmiths, glaziers, and other artisans. For all these purposes it is pulverized in large iron mortars or in steel mills, and the powder, which is rough and sharp, is carefully washed and sifted into eight or ten different degrees of fineness. Emery paper and emery cloth are made by laying a thin coat of glue upon the fabric, and dusting the emery from a sieve of the reouired size.

the emery from a sieve of the required size. Emery wheels are made of a cement in which the ground emery is contained, and the excellence of the wheel depends upon the nature of the cement. The aim is to make a cement which will wear away with the emery and not leave the cutting material below the surface of the wheel. The cement must also be strong enough to withstand the centrifugal force, and not fly to pieces when the wheel re-

volves at a high speed. The wheel must have an even texture throughout, and the same density, so that one side will not wear out before the other and thus throw the wheel out of balance. Various kinds of cement are made. For example, leather treated with acids and a strong glue, hard rubber, litharge, linseed oil, shellac, celluloid, silicate of soda, chloride of calcium, glue, and oxychloride of zinc. The emery is prepared for mixing with the cement by rolling or crushing the rock. For cutting and grindstone purposes, the emery crushed under a stamp or in a rock crusher is the best, as the corners and edges of the particles are sharper, but for polishing, the emery ground between rollers is preferred. Wooden wheels with leather glued to their rims, and emery powder glued on to the leather, are used for polishing. The wooden wheel is built up from segments glued and pinned together. Buffing wheels for polishing brass, nickel-plated sur-faces, copper, gold, and silver, are made of cotton or woolen cloth cut into discs and held together by iron flanges in the center.

**Emeu** (Emu) ( $\bar{e}$ 'm $\bar{u}$ ), a large cursorial bird, formerly dispersed over the whole Australian continent, but now almost extirpated in many districts. It is allied to the cassowary, but is distinguished by the absence of a "helmet"



on the top of the head. It nearly equals the ostrich in bulk, being thicker in the body, though its legs and neck are shorter. Its feet are three-toed, and its feathers, which are double, are of a dull sooty-brown color, those about the neck and head being of a hairy texture. The wings are small and useless for flight, but the bird can run with great speed, and emeu coursing as a sport is said to surpass that of the hare. The flesh of the young emeu is by some considered a delicacy. The emeu is a bird of the plain, the cassowary of the forest. It is easily tamed, and may be kept out of doors in temperate climates. It feeds on vegetable matter, fruits, roots, etc.

**Emeu Wren**, a small Australian bird allied to the warblers, somewhat similar to a wren, but having the tail feathers long, stiff, and thinly barbed, similar to emeu feathers.

Emigration, the departure of inhabitants from one country or state to another for the purpose of residence. The prime cause of such removal is over-population, though it is often influenced by particular and temporary incidents, such as an industrial crisis, a religious or political movement, the creation of a new colony, the desire to escape from laws regarded as oppressive or from compulsory military service. In barbarous times a tribe having exhausted the tract on which it had established itself, naturally migrated to more tempting territory. In Greece, the limited territories of the states rendered the occasional deportation of part of the inhabitants to form new colonies a necessity; while at Rome, where the land was held by a few proprietors, and the trades and professions mainly exercised by slaves, the larger part of the free population had few sources of income apart from the occupation of portions of conquered territory in Italy and elsewhere. During the Middle Ages emigration was to some extent stayed by the fact that the feudal system confined the mass of the people to the soil or within the insuperable limits of a corporation. Emigration, in its proper sense, to America, commenced with the departure of the Puritans who colonized New England; after which the Germans colonized Pennsylvania, the Dutch New York, the Swedes Delaware, the French Canada and Louisiana. Still the current of emigration was slow until 1815, when its rapid increase at first occasioned some alarm. Ultimately, however, acts forbidding emigration were either repealed or allowed to be-come obsolete, and toward the close of the period 1815-45 the annual emigration from Britain (only 2,081 in 1815) had risen on three occasions to fully 100,000. In 1847 it rose to over a quarter of a million, while in the five years, 1849-53, the average annual emigration was not less than 323,000. From the year 1855 the numbers diminished considerably, the annual average of the period 1855-59 being 134,304, and that of 1860-64 being only 127,779. Succeeding quinquennial periods, however, show, with the exception of the period 1875-79, a fairly steady increase, the numbers of the annual averages being: 1865-69,165,283;1870-74. 203,275; 1875-79, 124,503; 1880-84, 262,441. Of late years the higher numbers have been well maintained, the total for the year 1891 being 334,543, of whom 33,752 emigrants went to the North American colonies, 252,016 to the U.S., 19,957 to Australia and New Zealand, and 28.-775 to other places. Against these numbers there must, of course, be set a large influx. every year, of immigrants from abroad, the number of these in 1891 being 151,360. Other European countries have also sent out large numbers of emigrants, especially Germany, the Scandinavian countries, and Italy; Germany being second in numbers only to the United Kingdom. The great bulk of the Germans come to the U.S. Many Italians have in re-

cent years emigrated to the Argentine Republic. Em'met, ROBERT (1780-1803), an Irish patriot, b. at Cork. He was expelled from Trinity College, Dublin, in 1798, on the ground of exciting disaffection and rebellion, and having become an object of suspicion to the government, quitted Ireland. He returned there on the repeal of the suspension of the Habeas Corpus Act, and became a member of the Society of United Irishmen for the establishment of the independence of Ireland. In July, 1803, he was the ringleader in the rebellion in which Lord Kilwarden and others perished. He was arrested a few days afterward, tried, and executed. His fate excited special interest from his attachment to Miss Sarah Curran, daughter of the celebrated barrister.

Emotion, a term variously used by psychologists; sometimes as one of the divisions of feeling, the other being sensation; sometimes as opposed to feeling when the latter is identified with sensation; and sometimes as distinct from both sensation and feeling, when the last term is rigidly confined to the sense of pleas-ure or pain. In any of these uses, however, emotions are distinguished from sensations in that sensations are primary forms of consciousness arising by external excitation, are comparatively simple and immediately presenta-tive phenomena, and are definite in character and capable of localization; while emotions are secondary or derived forms of consciousness, are complex and representative, and are vague and diffused. Sensations are said to be "peripherally initiated, "while emotions are cen-trally initiated. When, in addition to its being distinguished from sensation, it is also distinguished from feeling, emotion is applied to the whole psychical condition accompanying the sense of pleasure or pain (feeling). The muscles of the body and the organic functions of the system are often considerably influenced by emotion, which naturally seeks an outward expression unless held in check by what Darwin has called serviceable associated habits.

**Emped** ocles (-klēz) (B. c. 460-400), a Greek philosopher of Agrigentum, in Sicily. He is said to have introduced the democratic form of government in his native city, and the Agrigentines regarded him with the highest veneration as public benefactor, poet. orator, physician, prophet, and magician.

**Emporia,** Lyon co., Kan., on Neosha River, 120 mi. s.w. of Kansas City. Railroads: Santa Fé, and two branches of M. K. & T. Industries: two flouring mills, iron foundry, creamrounding country agricultural. The State Normal School is located here, also Emporia College (Presbyterian). The town was first settled in 1857 and became a city in 1872. Pop. est. 1807, 10,000.

**Èmul'sion**, a medical preparation, consisting of an oily or resinous substance made to combine with water by some substance that itself has the property of combining with both, such as gum arabic, the yolk of eggs, almonds, etc.

**E'mys**, a genus of tortoises, type of the family Emydidæ which includes the terrapins of America and others.

Enam'el, a vitreous glaze of various colors

fused to the surface of gold, silver, copper, and The art of enameling, other substances. which is of great antiquity, was practised by the Assyrians and by the Egyptians, from whom it may have passed into Greece, and thence into Rome and its provinces, where various Roman antiquities with enameled ornamentation have been discovered. The Byzantines of the tenth century produced excellent cloisonné enamels on a gold base, the cloisonné process consisting in tracing the design in filicts of gold upon the gold plate and filing up the small molds thus formed with enamels, the design appearing in colored enamels separated by thin gold partitions or cloisons. In some cases, however, the enamels were filled into hollows beaten out in the gold plate, which formed part of the field. In the twelfth century the town of Limoges acquired the high reputation for inlaid enamels which it held till the fourteenth century, and reacquired in the sixteenth for its painted enamels. The costliness of the sculptured ground had led the Italians early in the fourteenth century to substitute the practise of incising the de-sign on the face of the plate, and then cover-ing it with a transparent enamel. The further step, which made the Limousin workshops famous, consisted in the method of superficial enameling, in which opaque colors or colors laid on a white opaque ground were used. The Limoges school degenerated greatly in the seventeenth century, but its method with certain modifications in detail is still employed. The basis of all kinds of enamel is a perfectly transparent and fusible glass, which is rendered either semitransparent or opaque by the admixture of metallic oxides. White enamels are composed by melting the oxide of tin with glass, and adding a small quantity of manganese or phosphate of calcium to increase the brilliancy of the color. The addition of the oxide of lead, or antimony, or oxide of silver, produces a yellow enamel. Reds are formed by copper, and by an intermixture of the oxides of gold and iron. Greens, violets, and blues are formed from the oxides of copper, cobalt, and iron. In the middle of the last century enameling was largely applied to the decoration of snuff boxes, tea canisters, candlesticks, and other small articles. Of late years it has been extensively applied to the coating of iron vessels for domestic purposes, the protection of the insides of baths, cisterns, and boilers, and the like. Enameling in colors upon iron is now common, iron plates being thus treated by means of various mixtures, and words and designs of various kinds being permanently fixed upon them by stenciling, for advertising, signboards, etc.

Encar' pus, in architecture, a sculptured ornament in imitation of a garland of fruits, leaves, or flowers, suspended between two points. The garland is of greatest size in the middle, and diminishes gradually to the points of suspension, from which the ends generally hang down. The encarpus is sometimes composed of an imitation of drapery similarly disposed, and sometimes of an as-

# **Encaustic Painting**

semblage of musical instruments, implements of war or of the chase.

Encaustic Painting, a kind of painting practised by the ancients, for the perfecting of which heating or burning in was required. Pliny distinguishes three species, in all of which wax was used along with colors. The art has been revived in modern times, but has not been greatly employed.

**Encaustic Tiles,** ornamental paving tiles of baked pottery, much used during the Middle Ages in the pavements of churches and other ecclesiastical edifices. The encaustic tile, strictly so called, was decorated with patterns formed by different colored clays inlaid in the tile and fired with it. The art appears to have originated in the latter part of the twelfth century, to have attained its highest perfection during the thirteenth, and to have sunk into disuse in the fifteenth.

Encke (en'ke), JOHANN FRANZ (1791-1865), German astronomer, b. at Hamburg. He became assistant in the observatory of Seeberg, near Gotha. Here he calculated the orbit of the cometobserved by Mechain, Miss Herschel, and Pons, predicted its return, and detected a gradual acceleration of movement, ascribed by him to the presence of a resisting medium. The fame of his works led to his appointment as director of the Berlin Observatory.



En' crinite, a name often applied to all the marine animals of the order Crinoidea or stone lilies, class

Enerinite Stems. (Mountain Limestone.)

Echinodermata, but more specifically restricted to the genera having rounded, smooth stems attached to the bottom, and supporting the body of the animal, which has numerous jointed arms radiating from a central disc, in which the mouth is situated.

Encyclopædia (Cyclopædia, or Cyclopedia), a systematic view of the whole extent of human knowledge or of particular departments of it, with the subjects arranged generally in alphabetic order. Varro and Pliny the Elder, among the Romans, attempted works of an encyclopiedic nature, the latter in his wellknown Historia Naturalis, or Natural History. Other ancient encyclopædic works were those of Stobæus and Suidas, and especially of Mar-cianus Capella. In the thirteenth century a work on a regular plan was compiled by the Dominican Vincent of Beauvais, in which was exhibited the whole sum of the knowledge of the Middle Ages. His work was entitled Speculum Historiale Naturale, Doctrinale, to which an anonymous author added, some years later. a Speculum Morale. Roger Bacon's Opus Majus also belonged to the encyclopædic class. In the seventeenth-century various encyclopædic works were compiled, such as the Latin one of Johann Heinrich Alsted. In 1674 appeared the first edition of Moreri's Le Grand Diction-naire Historique; in 1677 Johann Jacob Hoff-mann published at Basel his Lexicon Universale;

and in 1697 appeared Bayle's famous Dictionnaire Historique et Critique, which is still of great value. The first English alphabetical encyclopædia was the Lexicon Technicum, published in 1704. Among the chief English works of this kind are: 1, Ephraim Chambers's Cyclopædia, or & Universal Dictionary of Arts and Sciences, published in 1728 in 2 vols. folio. The Encyclopedia Britannica, published in Edinburgh, in nine editions - the first in 1788. the last in 1875-88 (24 vols. 4to, besides an index vol. 1880). The chief American encyclo-pædias are the Encyclopædia Americana, in 13 vols., 1829-33; the New American Cyclopedia, in 16 vols., 1858-63 and 1881, and Johnson's Universal Cyclopedia, 4 vols., 1874-77, and 8 vols., 1885. Of the French cyclopedias the most famous is the great Dictionnaire Encyclomost ramous is the great Dictionnate Engla-pédique by Diderot and D'Alembert; the Eng-clopédie Méthodique, ou par Ordre des Matières, Paris, 1781-1832, in 201 vols. 4to, of which 47 are plates; the Encyclopédie Moderne, 1824-32. 20 vols; and the large and valuable Grand Dictionnaire Universel du XIX Siècle, edited by Larousse, 16 vols. folio (with supplementary vols.). Numerous works of this kind have been published in Germany, the most popular being the Conversations-Levikon of Brockhaus, now in its thirteenth edition; Meyers's Kontersations-Lexikon, in its fourth edition; and that issued by Spamer, now in its second edition. The most comprehensive is the Allgemeine Encyklopadie, originally edited by Professors Ersch and Gruber, begun in 1818, and not yet completed. The index to the Chinese Encyclopadia of Literature and Science, complete in 5,040 volumes — the most stupendous literary undertaking ever projected - fills twenty substantial volumes.

Endicott, WILLIAM C., b. in Salem, Mass.. Nov. 19, 1827; was a justice of the Massachusetts supreme court from 1873 to 1883, and in 1884, as the Democratic candidate, was defeated in the race for the governorship. He was secretary of war under Mr. Cleveland.

Endless Screw, a mechanical contrivance, consisting of a screw, the thread of which gears into a wheel with skew teeth, the obliquity corresponding to the angle of pitch of the screw. It is generally employed as a means of producing slow motion in the adjustments of machines, rather than as transmitter of any great amount of power.

great amount of power. Endogenous Plants (en-doj'e-nus) (or Endogens), one of the large primary classes into which the vegetable kingdom is divided, so named in consequence of the new woody bundles being developed in the interior of the stem, in which there is no distinction of pith and bark. In transverse section these bundles appear scattered through the cellular matter. being more compact toward the circumference. The other organs of the plants are also characteristic. The leaves are generally parallel-veined, the flowers usually with three organs in each whorl, the seed has an embryo with one cotyledon, and the radicle issues from a sheath and is never developed into a tap-root in germination. To this class belong palms,

grasses, rushes, lilies, etc. Endogens increase in thickness only to a limited extent; hence they are not injured by twining plants as exogens are.

Endorhiza (-ri'za), in botany, a term descriptive of the radicle of the embryo of monocotyledonous plants, which is developed inside a sheath from which it issues in germination.

En'doskeleton, in anatomy, a term applied to the internal bony structure of man and other animals in contradistinction to *exoskeleton*, which is the outer and hardened covering of such animals as the crab, lobster, etc.

En'dosperm, the tissue surrounding the embryo in many seeds and which is contained with it within the testa. It contains the supply of food for the germinating embryo, and is also called albumen or perisperm.

Endym'ion, a personage of Greek mythology, according to various accounts a huntsman, a shepherd, or a king of Elis, who is said to have asked of Zeus, or to have received as a punishment, eternal sleep. Others relate that Selēnē, or Diana, conveyed him to Mount Latmos in Caria, and threw him into a perpetual sleep in order that she might enjoy his kisses whenever she pleased.

Ene'ma, any liquid or gaseous form of medicine for injection into the rectum. It is most commonly administered to induce peristaltic action of the bowels, but it is often the most desirable means of conveying into the system nourishment or stimulants.

En'ergy, in physics, the power that a body or system possesses of doing work. A body may possess energy in one of two forms, viz., as kinetic energy, that is, the energy due to mo-tion, and potential energy, that is, energy due to what may be called a position of advantage. Thus a moving mass, a bullet, for example, can do work in virtue of its motion, and the name kinetic energy is given to energy of this kind. Under this name is also included energy belonging to molecular motion, to electricity in motion, to heat and light, and to actual chemical action. Again, as examples of potential energy, we may take the case of a mass raised up to a position in which it is capable of doing work by falling-the weight of a clock, for instance; but the term also includes the energy due to electrical separation, to absorbed heat, and to chemical separation, as in gunpowder, which is ready to do work by means of its explosion. From the investiga-tions of Joule and others into the nature and phenomena of heat and the discovery of the equivalence of a definite quantity of mechanical energy to a definite quantity of heat, the grand principle of the conservation of energy was established. This asserts that the total amount of energy in the universe, or in any limited system which does not receive energy from without, or part with it to external matter, is invariable. If energy of any form seems to disappear in such a case it reappears in some other form. Thus, mechanical energy may be converted into heat. Heat again may be converted into the energy of electricity in motion, or into the potential energy of

chemical separation. And electrical energy, whether potential or kinetic, and the energy of chemical separation, are also convertible into heat. Connected with this principle is another which states that no known natural process is exactly reversible, and that if we transform mechanical energy into heat, for example, we never can pass back and obtain from the heat produced precisely the amount of mechanical energy with which we commenced. Whatever attempt is made to transform and retransform energy by an imperfect process, and no known process is perfect, part of the energy is necessarily transformed into heat. and is dissipated so as to be incapable of further useful transformation. It therefore follows, that as energy is in a constant state of transformation, there is a constant process of degradation of energy going on, a process by which energy constantly approaches the unavailable form of uniformly diffused heat; and this will go on till the whole of the energy of the universe has taken this final form.

En'field, a market town, England, county of Middlesex, 9 mi. n. by e. of London. It is the seat of the government manufactory of rifles and small arms. Pop. 31,532.

En'gadine, a beautiful valley in Switzerland, in the Grisons, on the banks of the Inn, bordering on the Tyrol, about 50 mi. long, but in some parts very narrow, divided into Upper and Lower. The pop. of the whole valley amounts to about 12,000. The cold, dry climate and mineral springs have made the valley a favorite resort for invalids.

Enghien (an.gi-an), LOUIS ANTOINE HENRI DE BOURBON, DUKE OF (1772-1804), b. at Chantilly. From 1796 to 1799 he commanded the vanguard of Condó's army, which was disbanded at the peace of Lunéville (1801). He was generally looked upon as the leader of the émigrés, and was suspected by Bonapartists of complicity in the attempt of Cadoudal to assassinate the first consul. An armed force was sent to seize him in Baden in violation of all territorial rights, and he was brought to Vincennes, 1804. A mock trial was held and he was shot in the ditch outside the walls.

En'gine, a mechanical contrivance in which one or other of the natural forces is utilized for the performance of work of some kind; often distinctively a steam engine.

**England,** including Wales, the southern and larger portion of the island of Great Britain. Its figure is, roughly speaking, triangular, but with many windings and indentations, the coast line measuring not less than 2,765 mi. The length of the country, measured on a meridian from Berwick nearly to St. Alban's Head, is 365 mi. Its breadth, measured on a parallel of latitude, attains its maximum between St. David's Head, in South Wales, and the Naze, in Essex, where it amounts to 280 mi. The area is 58,311 sq. mi., of which 50,-933 sq. mi. are in England, and 7,378 sq. mi. in Wales. This is exclusive of the Channel Islands and the Isle of Man, which together would add 302 sq. mi. more to the area. The subdivision of England into counties is said to date from the time when the country was still under several kings, but it does not appear to have assumed a definite form till the time of Alfred the Great. The existing division was first completed in the time of Henry VIII. The capital of England and of the British Empire is London. The cities next in size are: Liverpool, Manchester, and Salford, Birmingham, Leeds, Sheffield, Bristol, Nottingham, Bradford, and Hull. *Physical Features.*—The chief indentations

Physical Features.—The chief indentations are: on the east, the Humber, the Wash, and the Thames estuary; on the west, the Solway Firth, Morecambe Bay, Cardigan Bay, and the Bristol Channel. The most extensive stretches of flat coast are on the east, in the co. of Lincoln, and from the southern part of Suffolk to the South Foreland in Kent, and in Sussex and Hants on the south coast. The chief islands are: Holy Island, the Farne Islands, Sheppy, and Thaneton the east coast; the lsle of Wight on the south; the Scilly Isles at the southwest extremity; and Lunday Island, Anglesey, Holyhead, and Walney on the west.

The loftiest heights of England and Wales are situated at no great distance from its western shores, and consist of a succession of mountains and hills, stretching, with some interruptions, from north to south, and throwing out numerous branches on both sides, but particularly to the west, where all the culmi-nating summits are found. The northern portion of this range has received the name of the Pennine chain. In Derbyshire The Peak rises to the height of 2,030 ft. Amid these mountains lie the celebrated English lakes, of which the most important are Windermere, Derwent Water, Coniston Lake, and Ullswater. Here also is the highest summit of Northern England, Scawfell 3,-210 ft. The Pennine chain, with its appended Cumbrian range, is succeeded by one which surpasses both these in loftiness and extent, but has its great nucleus much farther to the west, where it covers the greater part of Wales, deriving from this its name, the Cumbrian range. Across the Bristol Channel from Wales is the Devonian range. Other ranges are the Cotswold Hills proceeding in a northeasterly direction from near the Mendip Hills; the Chiltern Hills taking a similar direction farther to the east; and the North and South Downs running eastward, the latter reaching the south coast near Beachy Head, the former reaching the southeast coast at Folkestone.

Large part of the surface of England consists of wide valleys and plains. Beginning in the north, the first valleys on the east side are those of the Coquet, Tyne, and Tees; on the west the beautiful valley of the Eden, which, at first hemmed in between the Cumbrian range and Pennine chain, gradually widens out into a plain of about 470 sq. mi. The most important of the northern plains is the Vale of York, which has an area of nearly 1,000 sq. mi. Properly speaking it is still the same plain which stretches, with scarcely a single interruption, across the counties of Lincoln, Suffolk, and Essex, to the mouth of the Thames, {

and to a considerable distance inland, comprising the Central Plain and the region of the Fens.

England is well supplied with rivers, many of them of great importance to industry and commerce. Most of them carry their waters to the North Sea. If we consider the drainage as a whole, four principal river basins may be distinguished, those of the Thames, Wash, and Humber belonging to the German Ocean; and the Severn belonging to the Atlantic. The basin of the Thames has its greatest length from e. to w., 130 mi., and its average breadth about 50 mi.; area 6, 160 sq. mi. The basin of the Wash consists of the subordinate basins of the Great Ouse, Nen, Welland, and Witham, which all empty themselves into that estuary, and has an area computed at 5,850 sq. mi. The basin of the Severn consists of two distinct portions, that on the right bank, of an irregularly oval shape, and having for its principal tributaries the Teme and the Wye; and that on the left, of which the Upper Avon is the principal tributary stream. The area of the whole basin is 8,580 sq. mi. The next basin, that of the Humber, the largest of all, consists of the three basins of the Humber proper, the Ouse, and the Trent, and its area is 9,550 sq. mi., being about one sixth of the whole area of England and Wales. Other rivers unconnected with these systems are the Tyne, Wear, and Tees in the northeast; the Eden, Ribble, Mersey, and the Dee in the northwest.

In regard to the minerals, climate. agriculture, manufactures, etc., of England, see Great Britain.

Cicil History.-The history of England proper begins when it ceased to be a Roman po session. On the withdrawal of the Roman forces, about the beginning of the fifth century A. D.. the South Britons, or inhabitants of what is now called England, were no longer able to withstand the attacks of their ferocious northern neighbors, the Scots and Picts. In the middle of the fifth century the occasional Teutonic incursions gave place to persistent inva-sion with a view to settlement. These Teutonic invaders were Low German tribes from the country about the mouths of the Elbe and Weser, the three most prominent being the Angles, the Saxons, and the Jutes. Of these the Jutes were the first to form a settlement. taking possession of part of Kent, the Isle of Wight, etc.; but the larger conquests of the Saxons in the south and the Angles in the north gave to these tribes the leading place in the kingdom. The struggle continued 150 years, and at the end of that period the whole southern part of Britain with the exception of Strathclyde, Wales, and West Wales (Cornwall), was in the hands of the Teutonic tribes. This conquered territory was divided among a number of small tribes or petty chieftaincies. seven of the most conspicuous of which are often spoken of as the *Heptarchy*. Each state was, in its turn annexed to more powerful neighbors; and at length, in 827, Egbert, by his valor and superior capacity, united in his own person the sovereignty of what had formerly been

seven kingdoms, and the whole came to be called England, that is Angle-land.

While this work of conquest and intertribal strife had been in progress toward the establishment of a united kingdom, certain impor-tant changes had occurred. The conquest had been the slow expulsion of a Christian race by a purely heathen race, and the country had returned to something of its own isolation with regard to the rest of Europe. The conversion of Kent, Essex, and East Anglia was followed by that of Northumberland and then by that of Mercia, of Wessex, of Sussex, and lastly of Wight, the contest between the two religions being at its height in the seventh century. The legal and political changes immediately consequent upon the adoption of Christianity were not great, but there resulted a more intimate relation with Europe and the older civilizations, the introduction of new learning and culture, the formation of a written literature, and the fusion of the tribes and petty kingdoms into a closer and more lasting unity than that which could have been otherwise secured.

The kingdom, however, was still kept in a state of disturbance by the attacks of the Danes, who had made repeated incursions during the whole of the Saxon period, and about half a century after the unification of the kingdom became for the moment masters of nearly the whole of England. But the genius of Alfred the Great, who had ascended the throne in 871, speedily reversed matters by the defeat of the Danes at Ethandune (878). The defeat of the Danes at Ethandune (878). two immediate successors of Alfred, Edward (901-925), and Athelstan (925-940), the son and the grandson of Alfred, both vigorous and able rulers, had each in turn to direct his arms against these settlers of the Danelagh. The reigns of the next five kings, Edmund, Edred, Edwy, Edgar, and Edward the Martyr, are chiefly remarkable on account of the conspicuous place occupied in them by Dunstan, who was counsellor to Edmund, minister of Edred, treasurer under Edwy, and supreme during the reigns of Edgar and his successor. During the tenth century many changes had taken place in the Teutonic constitution. Feudalism was already taking root; the king's authority had increased; the folkland was being taken over as the king's personal property; the nobles by birth, or ealdermen, were becoming of less importance in administration than the nobility of thegns, the officers of the king's court. Animosities between the English and the Danes became daily more violent, and a general massacre of the latter took place in 1002. The following year Sweyn invaded the kingdom with a powerful army and assumed the crown of England. Ethelred was compelled to take refuge in Normandy; and though he afterward returned, he found in Canute an adversary no less formidable than Sweyn. Ethelred left his kingdom in 1016 to his son Edmund, who displayed great valor, but was compelled to divide his kingdom with Canute; and when he was assassinated in 1017 the Danes succeeded to the sovereignty of the whole.

Canute (Knut), who espoused the widow of

Ethelred, that he might reconcile his new subjects, obtained the name of Great, not only on account of his personal qualities, but from the extent of his dominions, being master of Denmark and Norway as well as England. In 1035 he died, and in England was followed by two other Danish kings, Harold and Hardicanute, whose joint reigns lasted till 1042, after which the English line was again restored in the person of Edward the Confessor. On Edward's death in 1066 Harold, son of Earl Godwin, obtained the crown. He found, how-ever, a formidable opponent in the second cousin of Edward, William of Normandy, who instigated the Danes to invade the northern counties, while he, with 60.000 men, landed in the South. Harold vanquished the Danes, and hastening southward met the Normans near Hastings, at Senlac, afterward called Battle. Harold and his brothers fell (Oct. 14, 1066), and William (1066-87) immediately claimed the government as lawful king of England, being subsequently known as William I, the Conqueror. For some time he conducted the government with great moderation; but being obliged to reward those who had assisted him, he bestowed the chief offices of government upon Normans, and divided among them a great part of the country. The revolts of the native English which followed were quickly crushed.

At his death, in 1087, William II, commonly known by the name of Rufus, the conqueror's second son, obtained the crown, Robert, the eldest son, receiving the duchy of Normandy. In 1100, when William II was accidentally killed in the New Forest, Robert was again cheated of his throne by his younger brother Henry (Henry I), who in 1106 even wrested from him the duchy of Normandy. His reign was also marked by the suppression of the greater Norman nobles in England, whose power (like that of many continental feudatories) threatened to overshadow that of the king, and by the substitution of a class of lesser nobles. In 1135 he died in Normandy, leaving behind him only a daughter, Matilda.

By the will of Henry I his daughter Maud, or Matilda, wife of Geoffrey Plantagenet. Count of Anjou, and frequently styled the Empress Matilda, because she had first been married to Henry V, emperor of Germany, was declared his successor. But Stephen, son of the Count of Blois, and of Adela, daughter of William the Conqueror, raised an army in Normandy, landed in England, and declared himself king. After years of civil war and bloodshed an amicable arrangement was brought about, by which it was agreed that Stephen should continue to reign during the remainder of his life, but that he should be succeeded by Henry, son of Matilda and the Count of Anjou. Stephen died in 1154, and Henry Plantagenet ascended the throne with the title of Henry II, being the first of the Plantagenet or Angevin kings. He was also in the possession of Anjou, Normandy, and

Aquitaine. Henry II found difficulty in abridging the exorbitant privileges of the clergy, who claimed exemption not only from the taxes of the state, but also from its penal enactments, and who were supported in their demands by the primate Becket. The king's wishes were formulated in the Constitutions of Clarendon (1164), which were at first accepted and then repudiated by the primate. The assassination of Becket, however, placed the king at a disadvantage in the struggle, and after his conquest of Ireland (1171) he submitted to the church, and did penance at Becket's tomb. To curb the power of the nobles he granted charters to towns, freeing them from all subjection to any but himself, thus laying the foundation of a new order in society.

Richard I, called Cœur de Lion. who in 1189 succeeded to his father, Henry II, spent most of his reign away from England. Returning homeward from Palestine in disguise through Germany, he was made prisoner by Leopold, duke of Austria, but was ransomed by his subjects. In the meantime John, his brother, had aspired to the crown, and hoped, by the assistance of the French, to exclude Richard from his right. Richard's presence for a time restored matters to some appearance of order; but having undertaken an expedition against France, he received a mortal wound at the siege of Chalons, in 1199.

John was at once recognized as king of England, and secured possession of Normandy; but Anjou, Maine, and Touraine acknowledged the claim of Arthur, son of Geoffrey, second son of Henry II. On the death of Arthur, while in John's power, these four French provinces were at once lost to England. John's opposition to the pope in electing a successor to the see of Canterbury in 1205 led to the kingdom being placed under an interdict; and the nation being in a disturbed condition, he was at last compelled to receive Stephen Langton as archbishop, and to accept his kingdom as a fiel of the papacy (1213). His exactions and misgovernment had equally embroiled him with the nobles. In 1213 they refused to follow him to France, and on his return defeated, they at once took measures to secure their own privileges and abridge the prerogatives of the crown. King and barons met at Runnymede, and on June 15, 1215, the Great Charter (Magna Charta) was signed. It was speedily de-clared null and void by the pope, and war broke out between John and the barons, who were aided by the French king. In 1216, however, John died, and his turbulent reign was succeeded by the almost equally turbulent reign of Henry III.

During the first years of the reign of Henry III the abilities of the Earl of Pembroke, who was regent until 1219, retained the kingdom in tranquillity; but when, in 1227, Henry assumed the reins of government he showed himself incapable of managing them. The struggle long maintained in the great council (henceforward called Parliament) over money grants and other grievances reached an acute stage 1363, when civil war broke out. Simon de Montfort who had laid the foundations of the House of Commons by summoning representatives of the shire communities to the Mad Parliament of 1258, had by this time engrossed the sole power. He defeated the king and his son Edward at Lewes in 1264, and in his famous Parliament of 1265 still further widened the privileges of the people by summoning to it burgesses as well as knights of the shire. The escape of Prince Edward, however, was followed by the battle of Evesham (1265), at which Earl Simon was defeated and slain, and the rest of the reign was undisturbed.

On the death of Henry III, in 1272, Edward succeeded without opposition. In 1292 Bal-I liol, whom Edward had decided to be rightful heir to the Scottish throne, did homage for the fief to the English king; but when, in 1294, war broke out with France, Scotland also declared war. The Scots were defeated at Dunbar (1296), and the country placed under an English regent: but the revolt under Wallace (1297) was followed by that of Bruce (1306), and the Scots remained unsubdued. The reign of Edward was distinguished by many legal and legislative reforms, such as the separation of the old king's court into the Court of Exchequer, Court of King's Bench, and Court of Common Pleas, the passage of the Statute of Mortmain, etc. Two years later the imposition of taxation without consent of Parliament was forbidden by a special act. The great aim of Edward, however, to include England, Scotland, and Wales in one kingdom proved a failure, and he died in 1307, marching against Robert Bruce. The reign of his son Edward II was unfor-

The reign of his son Edward II was unfortunate to himself and to his kingdom. He made a feeble attempt to carry out his father's last and earnest request to prosecute the war with Scotland, but the English were almost constantly unfortunate; and at length. at Bannockburn (1314), they received a defeat from Robert Bruce which ensured the independence of Scotland. The king soon proved incapable of regulating the lawless conduct of his barons; and his wife, a woman of bold, intriguing disposition, joined in the confederacy against him, which resulted in his imprisonment and death in 1327.

The reign of Edward III was as brilliant as that of his father had been the reverse. The main projects of the third Edward were directed against France, the crown of which he claimed in 1328 in virtue of his mother, the daughter of King Philip. The victory won by the Black Prince at Crécy (1346), the capture of Calais (1347), and the victory of Poitiers (1356) ultimately led to the Peace of Brétigny in 1360, by which Edward III received all the west of France on condition of renouncing his claim to the French throne. Before the close of his reign, however, these advantages were all lost again, save a few principal towns on the coast.

Edward III was succeeded in 1377 by his grandson Richard II, son of Edward the Black Prince. The people of England now began to show, though in a turbulent manner. that

they had acquired just notions of government. In 1380 an unjust and oppressive poll tax brought their grievances to a head, and 100,000 men, under Wat Tyler, marched to-ward London (1381). Wat Tyler was killed while conferring with the king, and the prudence and courage of Richard appeased the insurgents. Despite his conduct on this occasion Richard was deficient in the vigor necessary to curb the lawlessness of the nobles. In 1398 he banished his cousin, Henry Bolingbroke: and on the death of the latter's father, the Duke of Lancaster, unjustly appropriated his cousin's patrimony. To avenge the injustice Bolingbroke landed in England during the king's absence in Ireland, and at the head of 60,000 malcontents compelled Richard to sur-He was confined in the Tower, and render. despite the superior claims of Edmund Mortimer, Earl of March, Henry was appointed king (1399), the first of the house of Lancas-Richard was, in all probability, murdered ter. early in 1400.

The manner in which the Duke of Lancaster, now Henry IV, acquired the crown rendered his reign extremely turbulent, but the vigor of his administration quelled every in-surrection. The most important-that of the Percies of Northumberland, Owen Glendower, and Douglas of Scotland-was crushed by the battle of Shrewsbury (1403). During the reign of Henry IV the clergy of England first began the practise of burning heretics under the act de haretico comburendo, passed in the second year of his reign. The act was chiefly directed against the Lollards, as the followers of Wickliffe now came to be called. Henry d. in 1413, leaving his crown to his son, Henry V, who revived the claim of Edward III to the throne of France in 1415, and invaded that country at the head of 30,000 men. The disjointed councils of the French rendered their country an easy prey; the victory of Agincourt was gained in 1415; and after a second campaign a peace was concluded at Troyes in 1420, by which Henry received the hand of Katherine, daughter of Charles VI, was appointed regent of France during the reign of his fatherin-law, and declared heir to the throne on his death. The two kings, however, d. within a few weeks of each other in 1422, and the infant son of Henry thus became king of England (as Henry VI) and France at the age of nine months.

England during the reign of Henry VI was subjected, in the first place, to all the confusion incident to a long minority, and afterward to all the misery of a civil war. Henry allowed himself to be managed by any one who had the courage to assume the conduct of his affairs, and the influence of his wife, Margaret of Anjou, a woman of uncommon capacity, was of no advantage either to himself or the realm. In France (1422-53) the English forces lost ground, and were finally expelled by the celebrated Joan of Arc, Calais alone being retained. The rebellion of Jack Cade in 1450 was suppressed, only to be succeeded by more serious trouble. In that year Richard, duke of York, the father of Edward, afterward Edward IV, began to advance his pretensions to the throne, which had been so long usurped by the house of Lancaster. His claim was founded on his descent from the third son of Edward III, Lionel, duke of Clarence, who was his great-great-grandfather on the mother's side, while Henry was the great-grandson on the father's side of John of Gaunt. duke of Lancaster, the fourth son of Edward III. Richard of York was also grandson on the father's side of Edmund, fifth son of Edward III. The wars which resulted, called the Wars of the Roses, from the fact that a red rose was the badge of the house of Lancaster and a white one that of the house of York, lasted for thirty years, from the first battle of St. Albans, May 22, 1455, to the battle of Bosworth, Aug. 22, 1485. Henry VI was twice driven from the throne (in 1461 and 1471) by Edward of York. whose father had previously been killed in battle in 1460. Edward of York reigned as Edward IV from 1461 till his death in 1483, with a brief interval in 1471; and was succeeded by two other sovereigns of the house of York, first his son Edward V, who reigned for eleven weeks in 1483; and then by his brother Richard III, who reigned from 1483 till 1485, when he was defeated and slain on Bosworth field by Henry Tudor, of the House of Lancaster, who then became Henry VII.

Henry VII was at this time the representative of the house of Lancaster, and in order at once to strengthen his own title, and to put an end to the rivalry between the houses of York and Lancaster, he married in 1486 Elizabeth, the sister of Edward V and heiress of the house of York. The king's worst fault was the avarice which led him to employ in schemes of extortion such instruments as Empson and Dudley. He d. in 1509.

The authority of the English crown, which had been so much extended by Henry VII, was by his son Henry VIII exerted in a tyrannical and capricious manner. The most important event of the reign was undoubtedly the Reformation; though it had its origin rather in Henry's caprice and in the casual situation of his private affairs than in his conviction of the necessity of a reformation in religion, or in the solidity of reasoning employed by the reform-Henry had been espoused to Catharine ers. of Spain, who was first married to his elder brother Arthur, a prince who died young. Henry became disgusted with his queen, and enamored of one of her maids of honor, Anne Boleyn. He had recourse, therefore, to the pope to dissolve a marriage which had at first been rendered legal only by a dispensation from the pontiff; but failing in his desires he broke away entirely from the Holy See, and in 1534 got himself recognized by act of Parliament as the head of the English Church. He d. in 1547. He was married six times, and left three children, each of whom reigned in turn, These were: Mary, by his first wife, Catharine of Aragon; Elizabeth, by his second wife, Anne Boleyn; and Edward, by his third wife, Jane Seymour.

Edward, who reigned first with the title of Edward VI, was nine years of age at the time of his succession, and d. in 1553 when he was only sixteen. His short reign, or rather the reign of the Earl of Hertford, afterward Duke of Somerset, who was appointed regent, was distinguished chiefly by the success which attended the measures of the reformers, who acquired a great part of the power formerly engrossed by the Catholics. The intrigues of Dudley, duke of Northumberland, during the reign of Edward, caused Lady Jane Grey to be declared his successor; but her reign, if it could be called such, lasted only a few days. Mary, daughter of Henry VIII, was placed upon the throne, and Lady Jane Grey and her husband were both executed. Mary, a bigoted Catholic, seems to have wished for the crown only for the purpose of re-establishing the Roman Catholic faith. Political motives had induced Philip of Spain to accept of her as a spouse; but she could never prevail on her subjects to allow him any share of power. She d. in 1558.

Elizabeth, who succeeded her sister Mary, was attached to the Protestant faith, and found little difficulty in establishing it in England. Having concluded peace with France (1559), Elizabeth set herself to promote the confusion which prevailed in Scotland to which her cousin Mary had returned from France as queen in 1561. In this she was so far successful that Mary placed herself in her power (1568), and after many years' imprisonment was sent to the scaffold (1587). As the most powerful Protestant nation, and as a rival to Spain in the New World, it was natural that England should become involved in difficulties with that country. The dispersion of the Armada by the English fleet under Howard, Drake, and Hawkins was the most brilliant event of a struggle which abounded in minor feats of valor. In Elizabeth's reign London became the center of the world's trade, the extension of British commercial enterprise being coincident with the ruin of Antwerp in 1585. In literature not less than in politics and in commerce the same full life displayed itself, and England began definitely to assume the characteristics which distinguish her from the other European nations of to-day.

To Elizabeth succeeded (in 1603) James VI of Scotland and I of England, son of Mary Queen of Scots and Darnley. His accession to the crown of England in addition to that of Scotland did much to unite the two nations, though a certain smouldering animosity still lingered. His dissimulation, however, ended in his satisfying neither of the contending ecclesiastical parties-the Puritans or the Catholics; and his absurd insistence on his divine right made his reign a continuous struggle between the prerogative of the crown and the freedom of the people. His extravagance kept him in constant disputes with the Parliament, who would not grant him the sums he demanded, and compelled him to resort to monopolies, loans, benevolences, and other illegal methods. The nation at large, however, continued to prosper through the whole of this inglorious reign. His son Charles I who succeeded him in 1625, inherited the same exalted ideas of royal prerogative, and his marriage with a Catholic, his arbitrary rule, and illegal methods of raising money, provoked bitter hostility. Under the guidance of Laud and Stafford things went from bad to worse. Civil war broke out in 1642 between the king's party and that of the Parliament, and the latter proving victorious, in 1649 the king was beheaded.

A commonwealth or republican government was now established, in which the most prominent figure was Oliver Cromwell. Mutinies in the army among Fifth-monarchists and Levelers were subdued by Cromwell and Fairfax, and Cromwell in a series of masterly movements subjugated Ireland and gained the important battles of Dunbar and Worcester. At sea Blake had destroyed the Royalist fleet under Rupert, and was engaged in an honorable struggle with the Dutch under Van Tromp. But within the governing body matters had come to a deadlock. A dissolution was necessary, yet Parliament shrank from dissolving itself, and in the meantime the reform of the law, a settlement with regard to the church, and other important matters remained un-touched. In April, 1653, Cromwell cut the knot by forcibly ejecting the members and putting the keys of the house in his pocket. From this time he was practically head of the government, which was vested in a council of thirteen. A parliament-the Little or Barebones Parliament-was summoned, in December of the same year. Cromwell was installed Lord Protector of the Commonwealth of England, Scot-land, and Ireland. With more than the power of a king, he succeeded in dominating the confusion at home and made the country feared throughout the whole of Europe. Cromwell d. in 1658, and the brief and feeble protectorate of his son Richard followed.

There was now a widespread feeling that the country would be better under the old form of government, and Charles II, son of Charles I, was called to the throne by the Restoration of 1660. He took complete advantage of the popular reaction from the narrowness and intolerance of Puritanism, and even latterly endeavored to carry it to the extreme of establishing the Catholic religion. The abolition of the censorship of the press (1670), and the reaffirmation of the habeas corpus principle are the most praiseworthy incidents of the reign.

As Charles II left no legitimate issue, his brother, the Duke of York, succeeded him as James II (1685-88). An invasion by an illeritimate son of Charles, the Duke of Monmouth, who claimed the throne, was supported by the wholesale butcheries of such instruments as Kirke and Jeffreys. The whole nation was prepared to welcome any deliverance, and in 1689 William of Orange, husband of James's daughter Mary, landed in Torbay. James fled to France, and a convention summoned by Wiliam settled the crown upon him, he thus

becoming William III. Annexed to this settlement was a Declaration of Rights circumscribing the royal prerogative by depriv-ing him of the right to exercise dispensing power, or to exact money, or to maintain an army without the assent of Parliament. This placed henceforward the right of the British sovereign to the throne upon a purely statutory basis. A toleration act, passed in 1689, released dissent from many penalties. An armed opposition to William lasted for a short time in Scotland, but ceased with the fall of Viscount Dundee, the leader of James's adherents; and though the struggle was prolonged in Ireland, it was brought to a close before the end of 1691. The following year saw the origination of the national debt, the exchequer having been drained by the heavy military ex-penditure. A bill for triennial parliaments was passed in 1604, the year in which Queen Mary died. For a moment after her death William's popularity was in danger, but his successes at Namur and elsewhere, and the obvious exhaustion of France, once more confirmed his power. The treaty of Ryswick followed in 1697, and the death of James II in exile in 1701 removed a not unimportant source of danger. Early in the following year William also died, and by the act of settlement Anne succeeded him.

The closing act of William's reign had been the formation of the grand alliance between England, Holland, and the German Empire, and the new queen's rule opened with the brilliant successes of Marlborough at Blenheim (1704) and Ramilies (1706). Throughout the earlier part of her reign the Marlboroughs practically ruled the kingdom, the duke's wife, Sarah Jennings, being the queen's most intimate friend and adviser. In 1707 the history of England becomes the history of Great Britain, the Act of Union passed in that year binding the parliaments and realms of England and Scotland into a single and more powerful whole. See art. Great Britain.

English Art.— As regards architecture little can be said with regard to the style prevalent between the invasion of the Anglo-Saxons and the Norman Conquest, from the fact that the remains of buildings erected in England before the Conquest are few and insignificant. The Norman style was introduced in the reign of Edward the Confessor. The Norman period proper extends from about 1090 to 1150, some of the best examples being parts of the cathedrals of Rochester, Winchester, Durham, and Canterbury. In the brief period 1160 to 1195 a marked change took place in the adoption of the pointed arch and what is known as the Early English style. Improved methods of construction led to the use of lighter walls and pillars instead of the heavy masses employed in the Norman style. Narrow lancet-shaped windows took the place of the round arch; bold projecting buttresses were introduced; and the roofs and spires became more lofty and more pointed, while in the interiors pointed arches rested on lofty clustered pillars. The Early English style has been regarded as lasting from 1190 to

1270, when the *Decorated style* of Gothic began to prevail. The transition to the Decorated style was gradual, but it may be considered as lasting to 1377. Between 1360 and 1300 the Decorated style gave place to the *Perpendicular*, which prevailed from 1377 to 1547, and was an exclusively English style. Gothic architecture, though it lingered on in many districts, practically came to an end in Eng-gland in the reign of Henry VIII. The Eliza-bethan and Jacobean styles which followed were transitions from the Gothic to the Italian, with which these styles were more or less freely mixed. In the reign of Charles I, Inigo Jones designed, among other buildings. Whitehall Classic style. After the great fire in London (1666) Sir Christopher Wren designed an immense number of churches and other build-ings in classic style, particularly St. Paul's Cathedral. Various phases of classic or Renaissance continued to prevail during the eighteenth and the earlier part of the nine-teenth century. About 1836 the Gothic revi-val commenced, and that style has been employed with considerable success in the churches erected in recent times. The Houses of Parliament, erected in 1840-1860 in the Tudor style, the Law Courts of Salford, St. Pancras railway station, and the Law Courts of London (opened 1822) in the Gothic served to sustain an impetus that had been given to the use of that style. At the present day Gothic is much employed for ecclesiastical and collegiate buildings, and a mild type of Re-naissance for civil buildings. Of late years a style that has received the name of "Queen Anne" is much in vogue for private residences. It is very mixed, but withal highly picturesque. The most striking novelties in the nineteenth century have been induced by the extensive use of iron and glass, as exemplified in the Exhibition building of 1851, the Crystal Palace. Sydenham, and the great railway stations.

Very little is known of the state of the art of *painting* among the Anglo-Saxons; but in the ninth century Alfred the Great caused numerous MSS, to be adorned with miniatures, and about the end of the tenth century Archbishop Dunstan won reputation as a miniature painter. Under William the Conqueror and his two sons the painting of large pictures began to be studied, and Lanfranc, archbishop of Canterbury, adorned the vault of his church with paintings. Down to the eighteenth century a succession of foreign painters resided in England, of whom the chief were Mabuse, Hans Holbein, Cornelius Jansen, Vandyck, Lely, and Kneller. Of native artists few are of importance prior to William Hogarth (1697-1764). Throughout the eighteenth century English artists attained higher eminence in portrait-painting than in other departments, and it culminated in Sir Joshua Reynolds (1723 -92), Thomas Gainsborough (1727-88), and Romney (1734-1802). Landscape painting was represented by Richard Wilson (1714-82), who painted classical scenes with figures from heathen mythology, and by Gainsborough already



8. Venus, hy John Gibson.

9. Amor and Psyche (Relief), by John Gibson.

10. Peri, by James Westmacott.



West view of Cathedral at Peterborough.



4. Interior of Chapel in King's College.



3. Ground Plan of Cathedral at Canterbury.



5. Southwest view of Cathedral at Canterbury.



6. Interior of St. Stephen's Church in London.



7. Interior of Cathedral at Rochester.
mentioned, who painted scenes of English nature and humble life. The Royal Academy of Arts, of which Reynolds was the first president, was established in London in 1769. In landscape the reputation of Turner (1775-1857) stands alone, solitary, colossal. Other distinguished landscape painters are Clarkson Stanfield (1798-1867); David Roberts (1796-1864), who greatly excelled in picturesque architect-ure; Wm. Müller (1812-45); and John Constable (1776-1837); whose works exercised great influence in France. In historical painting Hilton (1786-1839), Eastlake (1703-1865), Etty (1787 -1849), E. M. Ward (1816-79), C. W. Cope (b. 1811), and D. Maclise (1811-70) attained celeb-John Philip (1817-67) greatly distinrity. guished himself by his scenes from Spanish life and by his mastery in color. Landseer (1802-73) stands by himself as a painter of animals.

In 1824 the nucleus of the National Gallery was formed by the purchase of the Angerstein collection, and in 1832 the vote was passed for the erection of the National Gallery building. The competitions held in Westminster Hall in 1843, 1844, and 1847, with a view to the decoration of the houses of Parliament, exercised great influence on art. Up to this time English pictures were rather distinguished for color and effect of light and shade than for carefulness of modeling and exactness of drawing. In aiding to bring about a more accurate and careful style of work, the Pre-Raphaelites (1840-60), while seeking to restore in their practise an early phase of Italian art, exercised a beneficial influence, while they themselves ultimately abandoned the style to which at the first they had been devoted.

which at the first they had been devoted. The modern group of British painters may be held to date from about 1850. Prominent among these the following may be named: In historical painting Leighton, Alma-Tadenfa, Watts, Long, Goodall, Holman Hunt. Burne-Jones, and Madox Brown, as also W. P. Frith, whose Derby Day and Railcay Station so descriptive of modern life, may well be classed as historical. In figure painting, or genre, T. Faed, Erskine Nicol, Fildes. Orchardson, Herkomer, and Pettie. In portraiture Millais, Frank Holl, Ouless, and Richmond. In landscape Linnell, Hook, Peter Graham, John Brett, and Keeley Halswelle. In water colors the most eminent artists have been Girtin, Cotman, Liverseege, Stothard, Turner, and David Cox.

English sculpture was long merely an accessory to architecture, and few English sculptors are known by name till comparatively modern times. During the Renaissance period Torregiano came from Italy and executed two masterpieces in England, the tomb of the mother of Henry VII, and that of Henry himself at Westminster. After the Restoration two sculptors of some note appeared, Grinling Gibbons, a wood carver, and Caius Gabriel Cibber. John Flaxman and his rival and successor, Sir Francis Chantrey, acquired renown by the busts and statues which they made of many of the eminent men of the time. W. H. Thorneycroft, J. E. Boehm, E. Onslow Ford.

C. B. Birch, and Alfred Gilbert are among the foremost sculptors of the present time.

English Language. - The language spoken in England from the settlement of the Anglo-Saxons to the Norman Conquest (say 500-1066) is popularly known as Anglo-Saxon, though simply the earliest form of English. It was a highly inflected and purely Teutonic tongue presenting several dialects. The Conquest introduced the Norman-French, and from 1066 to about 1250 two languages were spoken. the native English speaking their own language, the intruders speaking French. During this period the grammatical structure of the native language was greatly broken up. inflexions fell away, or were assimilated to each other; and toward the end of the period we find a few works written in a language resembling the English of our own day in grammar, but differing from it by being purely Saxon or Teutonic in vocabulary. Finally. the two languages began to mingle and form one intelligible to the whole population. Nor-mans as well as English, this change being marked by a great infusion of Norman-French words, and English proper being the result. English is thus, in its vocabulary, a composite language, deriving part of its stock of words from a Teutonic source and part from a Latin source, Norman-French being in the main merely a modified form of Latin. In its grammatical structure and general character, how-ever, English is entirely Teutonic, and is classed with Dutch and Gothic among the Low German tongues. If we divide the history of the English language into periods we shall find three most distinctly marked: 1. the Old English or Anglo-Saxon, extending down to about 1100; 2, the Middle English. 1100-1400 (to this period belong Chaucer, Wickliffe, Langland); 3, Modern English. A more detailed subdivision would give transition priods connecting the main ones. The chief change which the language has experienced during the modern period consists in its ab-sorbing new words from all quarters in obdience to the requirements of advancing science, more complicated social relations, and increased subtlety of thought. At the present time the rapid growth of the sciences already existing, and the creation of new ones, have caused whole groups of words to be introduced, chiefly from the Greek.

English Literature.—Before any English literature. in the strict sense of the term, existed. four literatures had arisen in England-the Celtic, Latin, Anglo-Saxon, and Anglo-Norman. The first includes such names as those of Taliesin, Llywarch Hen, Aneurin, and Merlin or Merddhin. The Latin literature prior to the Conquest presents those of Aldhelm, Bede. Alcuin, Asser, Ethelwerd, and Nennius. With the coming of the Normans, although the Anglo-Saxon Chronicle was continued until 1134, the native language practically ceased for a time to be employed in literature. Latin being employed in law, history, and philosophy: French in the lighter forms of literature. The Latin literature included important contribu-

tions to the Scholastic philosophy by Alexander Hales (d. 1245), Duns Scotus (d. 1308), and William of Occam (d. 1347), the philosophic works of Roger Bacon(1214-92), the Golias poems of Walter Map, and a long list of chronicles or histories, either in prose or verse, by Eadmer (d. 1124), Ordericus Vitalis (d. 1142), William of Malmesbury (d. 1143), Geoffrey of Monmouth (d. 1154), Joseph of Exeter (d. 1195), Roger of Wendover (d. 1237), Giraldus Cambrensis (d. 1222), and Matthew Paris (d. 1259).

Apart from a few brief fragments, the first English writings after the Conquest are the Brut of Layamon (about 1200), based on the Brut of Wace. Next in importance come the rhyming chroniclers, Robert of Gloucester, and Robert of Brunne, or Mannyng (d. 1340). To this pre-Chaucerian period belong also several English translations of French romances -Horn, Tristrem, Alisaunder, Havelok, and Between the beginning and the midothers. dle of the fourteenth century the English speech had entered upon a new phase of development in the absorption of Norman-French words. A rapid expansion of the literature followed, having as the foremost figure that of Chaucer (1340-1400), who. writing at first under French influences, and then under Italian, became in the end the most representative English writer of the time. Contemporary with him were the poets William or Robert Langland (1332-1406), John Gower (1325-1408), John Barbour (1316-95). In prose the name of John Wickliffe (1324-84) is pre-eminent, the English version of Mandeville's Travels being apparently of later date.

The period from the time of Chaucer to the appearance of Spenser, that is, from the end of the fourteenth to near the end of the sixteenth century, is a very barren one in English literature, in part probably owing to foreign and domestic wars, the struggle of the people toward political power, and the religious controversics preceding and attending the Reformation. The literature was chiefly polemical, the only noteworthy prose prior to that of More being that of Reginald Pecock (1390-1460), Sir John Fortescue (1305-1485), the Paston Letters (1422-1505), and Malory's *Morte d' Arthur* (completed 1460-70); the only noteworthy verse, that of John Skelton (1460-1520).

It was now that several events of European importance combined to stimulate life and enlarge the mental horizon—the invention of printing, or rather of movable types, the proomy, the discovery of America, the Renaissance, and the Reformation. The Renaissance spread from Florence to England by means of such men as Colet, Linacre, Erasmus, and Sir Thomas More (1480–1535), the last noteworthy as at the head of a new race of historians. Important contributions to the prose of the time were the *Tyndale New Testament*, printed in 1525, and the *Coverdale Bible* (1535). The first signs of an artistic advance in poetic literature are to be found in Wyatt (1503–42) and Surrey (1516-47), who nationalized the sonnet.

and of whom the latter is regarded as the introducer of blank verse. The drama, too, had by this time reached a fairly high stage of development. The mystery and miracle plays, after the adoption of the vernacular in the fourteenth century, passed from the hands of the clergy into those of the laity, and both stage and drama underwent a rapid seculari-The morality began to embody matzation. ters of religious and political controversy, historical characters mingled with the personification of abstract qualities, real characters from contemporary life were introduced, and at length farces on the French model were constructed, the Interludes of John Hayward (d. 1505) being the most important examples. To Nicholas Udall (1504-56) the first genuine comedy, Ralph Roister Doister, was due, this being shortly afterward followed by John Still's Gummer Gurton's Needle. The first tragedy, the Ferrex and Porrex, or Gorboduc of Sackville and Norton, was performed in 1561, and the first prose play, the Supposes of Guscoigne in 1566. Gascoigne and Sackville were in other regards than drama noteworthy among the earlier Elizabethans; but the figures which bulk most largely are those of Sidney and Spenser. In drama Lyly, Peele, Greene, Nash, and Marlowe are the chief immediate precursors of Shakespeare, Marlowe alone, however, being at all comparable with the great Contemporary and later dramatic master. writers were Ben Jonson, the second great Elizabethan dramatist, Middleton Marston, (better known as a satirist). Chapman, Thomas Heywood, Dekker, Webster, Ford, Beaumont and Fletcher, and Massinger. In Elizabethan prose the prominent names are those of Roger Ascham, Lyly the Euphuist, Hooker, Raleigh, Bacon, the founder in some regards of modern scientific method, Burton, Herbert of Cherbury, and Selden, with Overbury, Knolles. Holinshed, Stowe, Camden, Florio, and North. The issue of the authorized version of the Bible in 1611 may be said to close the prose list of the period.

After the death of James I the course of literature breaks up into three stages, the first from 1625 to 1640, in which the survivals from the Elizabethan Age slowly die away. The "metaphysical poets." Cowley, Wither, Her-bert, Crashaw, Habbington, and Quarles, and the cavalier poets, Suckling, Carew, Denham, all published poems before the close of this period, in which also Milton's early poems were composed, and the Comus and Lycidas published. The second stage (1640-60) was almost wholly given up to controversial prose, the Puritan revolution checking the production of pure literature. In this controversial prose of the time Milton was easily chief. With the Restoration a third stage was begun. Milton turned his new leisure to the composition of his great poems; the drama was revived, and Davenant and Dryden, with Otway, Southerne, Etherege, Wycherley, Congreve, Vanbrugh, and Farquhar in their first plays, and minor playwrights, are the most representative writers of the period. Butler established a genre

49

in satire, and Marvell as a satirist in some respects anticipated Swift; Roscommon, Rochester, and Dorset contributed to the little poetry: while in prose we have. Hobbes, Clarendon, Fuller, Sir Thomas Browne, Walton, Cotton. Pepys and Evelyn, John Bunyan, Locke, Sir William Temple, Owen Feltham, Sir Henry Wotton, James Harrington, and a crowd of theological writers, of whom the best known are Jeremy Taylor ("Spenser of prose" and "Shakespeare of divines"). Richard Baxter, Robert Barclay, William Penn, George Fox, Isaac Barrow, John Tillotson, Stillingfleet, Bishop Pearson, Sherlock, South, Sprat, Cudworth, and Burnet. Other features of the last part of the seventeenth century were the immense advance in physical science under Boyle, Isaac Newton, Harvey, and others, and the rise of the newspaper press.

rise of the newspaper press. Dryden's death in 1700 marks the commencement of the so-called Augustan Age in English literature. During it, however, no greater poet appeared than Pope (1688-1744), in whom sagacity, wit, and fancy take the place of the highest poetic faculty, but who was a supreme artist within the formal limits of his conception of metrical art. Against these formal limits signs of reaction are apparent in the verse of Thomson, Gray, Collins, Goldsmith, and in the productions of Macpherson and Chatterton. The poets Prior, Gay, and Ambrose Phillips inherit from the later seventeenth century, Gay being memorable in connection with English opera; and there are a large number of small but respectable poets. It is in prose that the chief development of the eighteenth century is to be found, Defoe and Swift led the way in fiction and prose satire: Steele and Addison, working on a suggestion of Defoe, established the periodical essay. Goldsmith also falls into the fictional group as well as into those of the poets and the essayists. Johnson exercised during the latter part of his life the power of a literary dictator, with Bosweil as literary dependent. The other chief prose writers were Bishop Berkeley, Arbuthnot, Bolingbroke, Burke, the historians David Hume, William Robertson, Edmund Gibbon; the political writers Wilkes and Junius; the economist and moral philosopher, Adam Smith; the philosophical writers, Hume, Bentham, and Dugald Stewart; the scholars, Bentley, Sir William Jones, and Richard Porson; the theologians, Atterbury, Butler, Warburton, and Paley, and some inferior playwrights, of whom Rowe, John Home, Colley Cibber, Colman the elder, Foote, and Sheridan were the most important.

With the French Revolution, or a few years earlier, the modern movement in literature may be said to have commenced. The departure from the old traditions, traceable in Gray and Collins, was more clearly exhibited in the last years of the century in Cowper (1731-1800) and Burns (1759-96), and was developed and perfected in the hands of Blake, Bowles, and the "Lake Poets," Wordsworth, Coleridge, and Southey; but there were at first many survivals from the poetic manner of the seventeenth century, such as Erasmus Darwin, Dr. John

Wolcot, Robert Bloomfield, and Samuel Rog-Among the earlier poets of the century, also, were George Crabbe, Sir Walter Scott. Hogg, Campbell. A more important group was that of Byron, Shelley, and Keats with which may be associated the names of Leigh Hunt, Thomas Moore, and Landor. Among the earlier writers of fiction there were several women of note, such as Maria Edgeworth, and Jane Austen. The greatest name in fiction is Sane Austen. The greatest name in action is unquestionably that of Scott. Other prose writers were Mackintosh, Malthus, Hallam, James Mill. Southey, Hannah More, Cob-bett, William Hazlitt, Sydney Smith. In the literature since 1830 poetry has included as its chief names those of Praed, Hood. Sidney Dobell, Alexander Smith, Charles Mackay William Allingthem Elizabeth Bar. Mackay, William Allingham, Elizabeth Barrett-Browning, Coventry Patmore, Lord Lytton (Owen Meredith), Arthur Hugh Clough. Matthew Arnold, Dante G. Rossetti, Robert Buchanan, Wm. Morris, Swinburne, and last and greatest, Tennyson and Browning. A brilliant list of novelists for the same period includes Lord Lytton, Ainsworth, Benjamin Disraeli (Earl of Beaconsfield), Dickens, Thackeray, Charles Kingsley, Charlotte Bronté. Wilkie Collins, George Mac Donald, Charles Reade, George Eliot, William Black, Thomas Hardy, R. D. Blackmore, George Meredith. Mrs. Craik (Miss Muloch), Mrs. Öliphant. Miss Yonge, Miss Thackeray, and others. To the historical and biographical list belong Allison. Macaulay, Carlyle, Cornwall Lewis, Milman. Froude, Lecky, Kinglake, John Richard Green, Dean Stanley, John Morley, Leslie Stephen. Prominent among the theological writers have been Dr. Newman, Whately, Augustus and Julius Hare, Maurice, Hamilton. Alford, Stopford Brooke, Liddon, Isaac Taylor. James Martineau, and Caird. In science and philosophy among the chief writers have been Sir W. Hamilton, John Stuart Mill, Alex-ander Bain, Hugh Miller, Charles Darwin, Humler Marthell Mar Miller, Charles Darwin, Huxley, Tyndall, Max Müller, Herbert Spencer. T. H. Green. Of the other prose writers of importance the chief are De Quincey, Harriet Martineau, Sir Arthur Helps, Ruskin, Mat-thew Arnold, W. E. Gladstone. For American Literature see United States.

English Channel, the arm of sea which separates England from France, extending, on the English side, from Dover to the Land's End; and on the French, from Calais to the Island of Ushant.

Engraving, the art of representing objects and depicting characters on metal, wood, precious stones, etc., by means of incisions made with instruments variously adapted to the substances operated upon and the description of work intended. Impressions from metal plates are named engravings, prints, or plates; those printed from wood being called indifferently wood engravings and woodcuts. While, however, these impressions are not altogether dissimilar in appearance, the processes are distinct. In plates the lines intended to print are incised, and in order to take an impression the plate is daubed over with a thick ink which fills all the lines. The surface is then wiped perfectly clean, leaving only the incised lines filled with ink. A piece of damp paper is now laid on the face of the plate, and both are passed through the press, which causes the ink to pass from the plate to the paper. This operation needs to be repeated for every impression. In the wood block, on the contrary, the spaces between the lines of the drawing are cut out, leaving the lines standing up like type, the printing being from the inked surface of the raised lines, and effected much more rapidly than plate printing.

Engraving on wood, intended for printing or impressing from, long preceded engraving on metals. The art is of Eastern origin, and at least as early as the tenth century engraving and printing from wood blocks was common in China. We first hear of wood engraving being cultivated in Europe by the Italians and Germans in the thirteenth century. For a hundred and fifty years, however, there is small indication of the practise of the art, which was at first confined to the production of block books, playing cards, and religious prints. In the fifteenth century the art of printing from engraved plates was discovered in Florence by Maso Finiguerra. Engraving had long been used as a means of decorating armor, metal vessels, etc., the engravers generally securing duplicates of their work before laying in the niello (a species of metallic enamel) by filling the lines with dark color, and taking casts of them in sulphur. The discovery of the practicability of taking impressions upon paper led to engraving upon copper plates for the purpose of printing from. The plates for the purpose of printing from. date of the earliest known niello proof upon paper is 1452. The work of the Florentine engravers, however, was almost at once surpassed in Venice and elsewhere in North Italy by Andrea Mantegna (1431-1505), Girolamo Mocetto, Giovanni Batista del Porto, and others. In Marc Antonio Raimondi (1475-1534), who wrought under the guidance of Raphael, and reproduced many of his works, the art reached its highest point of the earlier period, and Rome became the center of a new school, which included Marco da Ravenna (d. 1527), Giulio Bonasone (1531-1572), and Agostino de Musis (d. 1536). In the meantime, in Germany the progress of the art had been not less rapid. Of the oldest school the most important engraver is Martin Schongauer (1420-1488). He was, however, surpassed a generation later by Albert Durer (1471-1528), who excelled both in copper and wood engraving, especially in the latter. The Dutch and Flem-ish schools, of which Durer's contemporary, Lucas van Leyden was the head, did much to enlarge the scope of the art. Rubens (1577-1640) influenced engraving through the two Bolswerts, Vorstermann, Pontius and P. de Jode, who engraved many of his works on a large size. Toward the end of the seventeenth century etching, which had before been rarely used, became more common, and was practised with great success by Rembrandt

(1607-1669) and other painters of that period. In France Noel Garnier founded a school of engraving about the middle of the sixteenth century; but it produced no work of any high distinction until the reign of Louis XIV, when Nanteuil's pupils Gerard Edelinck and Gerard Audran flourished. But these were all surpassed about the middle of the eighteenth century by Wille (1717-1807), a German resident in Paris. Before the middle of the seventeenth century England produced little noteworthy work, availing herself principally of the work of foreign engravers, of whom many took up temporary and even perma-nent residence. The first English engraver of marked importance was William Hogarth (1697-1764). Vivares (1712-1782). a Frenchman by birth, laid the foundation of the English school of landscape engraving, which was still further developed by William Woollet (1735-1785), who was also an excellent engraver of the human figure. The substitution of steel for copper plates (1820-1830) gave the power of producing a much larger number of fine impressions, and opened new possibilities for highly finished work. During the closing years of the eighteenth century line engraving attained a depth of color and fullness of tone in which earlier works generally are deficient, and during the present century it has reached a perfectness of finish which it had not previously attained. Among engravers who have produced historical works of large size and in the line manner the names of Raphael Morghen (1758-1833), Longhi (1766-1831), and Toschi, in Italy; of Forster (1790-1872), and Blanchard (b. 1819), in France; of John Burnet (1784-1868), J. H. Robinson (1796-1871), Geo. T. Doo (1800-1886), J. H. Watt (1799-1867), and Lumb Stocks (b. 1812), in England, stand preeminent. In the period 1820-60 landscape engraving attained a perfection in Great Britain which it had not attained in any other country, or at any other time. In the period 1830-45 various publications called Annuals, composed of light literature in prose and verse, and illustrated by highly finished engravings in steel, were very popular. The unrivaled illustrations of Rogers's Poems and Rogers's Raly, after Turner and Stothard, belong to this Many of the originals of the engravperiod. ings in the Annuals were finished pictures of large size. A great part of the difficulty in engraving on a small scale from a large picture, consists in determining what details can be left out, and still preserve the full effect and character of the original. Since 1870 many plates have been produced by a combination of etching and dry point, a comparatively cheap and rapid process. Such works have been fashionable and very popular with collectors. But while some of them have been excellent of their kind, the process is of limited resource, and the best works in this manner will not stand comparison with the masterpieces of line engraving. In France and in Germany some able line engravers are in practise.

Line Engraving, as implied by the term, is executed entirely in lines. The tools are few and simple. They consist of the graver, or burin, the point, the scraper, and the burnisher; an oil stone or hone, dividers, a parallel square, a magnifying lens; a bridge on which to rest the hand; a blind or shade of tissue paper, to make the light fall equally on the plate, callipers for leveling important erasures, a small steel anvil, a small pointed hammer, and punches. In etching, the following articles are required: a resinous mixture called etching ground, capable, when spread very thinly over the plate, of resisting the action of the acids used; a dauber for laying the ground equally; a hand vice; some hair pencils of different sizes, and bordering wax, made of Burgundy-pitch, beeswax, and a little oil.

In engraving, the plate, which is highly polished and must be free from all scratches, is first prepared by spreading over it a thin layer of ground. The surface is then smoked, and the outline of the picture transferred to it by pressure from the paper on which it has been drawn in fine outlines by a black lead pencil. The picture is then drawn on the ground with the etching needle, which removes the ground in every form produced by it, and leaves the bright metal exposed. A bank of wax is then put round the plate and diluted acid poured on it, which eats out the metal from the lines from which the ground has been removed, but leaves the rest of the plate untouched. The leaves the rest of the plate untouched. plate is then gone over with the graver, the etched lines clearly defined, broken lines connected, new lines added, etc. Sometimes the plate is rebitten more than once, those parts which are sufficiently bitten in the first treatment being stopped with varnish, and only the selected parts exposed to after-biting. Finally the burnisher is brought into play alternately with the graver and point to give perfectness and finish. Such is the process for landscape In historical and portrait engravengraving. ing of the highest class, the lines are first drawn on the metal with a fine point and then cut in by the graver, first making a fine line and afterward entering and re-entering till the desired width and depth of lines is attained. Much of the excellence of such engravings depends on the mode in which the lines are laid, their relative thickness, and the manner in which they cross each other. In historical engraving etching is but little used, and then only for accessories and the less important parts.

Soft-ground Etching .- The ground, made by mixing lard with common etching ground, is laid on the plate and smoked as before, but its extreme softness renders it very liable to injury. The outline of the subject is drawn on a piece of rough paper larger than the plate. The paper is then damped, and laid gently over the ground face upward, and the margins folded over and pasted down on the back of When the paper is dry and tightly the plate. stretched the bridge is laid across, and with a hardish pencil and firm pressure the drawing The presis completed in the usual manner. sure makes the ground adhere to the back of the paper at all parts touched by the pencil,

## Engraving

and on the paper being lifted carefully off. these parts of the ground are lifted with it, and the corresponding parts of the plate thus left bare are exposed to the subsequent action of the acid. The granulated surface of the paper, causing similar granulations in the touches on the ground, gives the character of a chalkdrawing. The biting-in is effected in the same manner as already described, and the subject is finished by rebiting and dotting with the graver.

Stipple, or Chalk Engraring, in its pure state. is exclusively composed of dots, varying in size and form as the nature of the subject demands; but few stipple plates are now produced without a large admixture of line in all parts. flesh excepted. A great advance, however, has been made in stipple engraving by the introduction of large and varied forms of dotting in the draperies, the results almost rivaling line engraving in richness and power.

line engraving in richness and power. The process of Aquatint and Mezzotint will be found under their respective heads, the latter differing from all other styles of engraving in that the lights and gradations are scraped or burnished out of a dark ground that has first been wrought upon the plate, instead of the forms being corroded or cut into a plain surface.

The Mixed Style is based on mezzotinto, which, still forming the great mass of shading. is in this method combined with etching in the darker, and stipple in the more delicate parts. By this combination a plate will produce a larger number of good impressions than were it done entirely in mezzotinto.

Engraving on Wood .- Wood engravings are made on Turkish boxwood which ranges in value from one eighth of a cent to eight cents a square inch. The finer the grain the higher the price, and the fine, close-grained wood is only used for the best work. The wood is cut across the grain, and as a boxwood log is seldom over four inches in diameter, the blocks of wood are joined together. So perfect is the joining that the joints cannot be detected. A slab of boxwood is as thick as type are long. One side of the slab is polished and finished. and wherever there are imperfections in the wood, a hole is bored and a plug of wood is neatly inlaid. A block of the required size is sawed from the slab and prepared for the artist. If the artist is to draw the design or picture to be engraved on the block, the engraver scours the face of the block with pum-ice stone and a little water. When the wood is bright enough the water is dried off and a little flake white is rubbed over the surface. This gives a drawing surface. The artist then sketches the design and turns the block over to the engraver.

Sometimes the object which is to be reproduced by the wood engraver is photographed on the face of the block. A reverse negative is obtained, and the face of the wood is coated with gelatin and treated with a mixture of zinc white and acids. The surface is then sensitized with nitrate of silver in a "dark room." The negative is clamped to the block.

film side next to the wood, and a photographic print is made in the usual manner. The wood engraver's tools are delicate and made of the finest steel, and are called gravers. These include "tint" tools, which are used for cutting mechanical or perfectly straight parallel lines; "lozenge" tools, used for cutting artistic or curved lines; elliptical tools, gouges, etc. If a slip of the knife is made, a hole is bored in the block where the tool slipped, and a plug of wood is inserted. Before the engraver begins cutting out the design he gums a piece of paper over the sketch or photograph, he tears out a hole over that part of the work where he begins engraving. The of the work where he begins engraving. paper keeps the hand and fingers from smudging the drawing, and as the work progresses he enlarges the hole. After the job is finished a proof is taken under a hand press, and if it is satisfactory the woodcut is sent to the electrotyper, as the printing is not done from the

woodcut, but from electrotypes of it. En'nius, QUINTUS (B.C. 239-169), an early Latin poet, considered by the Romans as the father of their literature, was b. at Rudiæ.

**Enns**, a river in Austria, which rises in the Alps of Salzburg, and enters the Danube a little below the town of Enns. Total course about 160 mi.

**Enoch**, Book of, an apocryphal book of an assumedly prophetical character, to which considerable importance has been attached on account of its supposed quotation by St. Jude in the fourteenth and fifteenth verses of his epistle. It is referred to by many of the early fathers; is of unknown authorship, but was probably written by a Palestinian Hebrew. Its date is also uncertain, critical conjecture ranging from 144 B.C. to 132 A.D.

Ensliage (or Silage), green forage crops preserved as near as possible in its natural condition for stock food. If properly handled it is relished by nearly all kinds of farm animals, especially by cattle. At the present time it is largely used by dairy farmers. All kinds of forage can be used for ensilage but corn is the favorite crop. An air-tight mow or silo is used for storing ensilage. It is generally made in a portion of the barn and should be very near the place of feeding. The higher the silo the better the ensilage will keep as it becomes more compact, thus better excluding the air. Some build the silo round, others octagonal, but more generally they are square with diagonal pieces perhaps six or eight inches wide, placed in the corners. The bottom should be on a cement floor. The main point in raising corn for ensilage is to get as large a crop as possible of both forage and corn. When the corn is of both forage and corn. nearly ripe enough for ordinary cutting, it is drawn to the silo and cut in proper lengths for storing, It is well distributed in the silo and thoroughly tramped, special care being taken at the sides and corners. Two days' time is sufficient for filling the average silo. If the silo is 20 or 30 ft. in height, the ensilage will settle from 5 to 7 ft., and if more ensilage is required it can be refilled after settling three or four days. One or two loads of straw is run

#### Entozoa

through the cutter and placed on top of the ensilage for covering. In the winter it is fed with little trouble. The cattle will eat it up clean. Horses and sheep also are very fond of it. A small amount of space for storing a large amount of stock food is one of the economic points in favor of ensilage. A cubic foot in the silo will weigh 40 to 50 fb.

Entab' lature, in architecture, the horizontal, continuous work which rests upon a row of columns, and belongs especially to classical architecture. It consists of three principal



Example of Doric Entablature.

divisions — the architrare immediately above the abacus of the column, next the *frieze*, and then the cornice. In large buildings projections similar to and known also as entablatures are often carried round the whole edifice, or along one front of it.

Enta'da, a genus of leguminous phants, suborder Mimoseæ, containing about a dozen species of climbing tropical shrubs, remarkable for the great size of their pods. *E. scandens* has pods which measure from 6 to 8 ft. in length. The seeds have a hard, woody, and beautifully polished shell, and are often made into snuff-boxes, scent-bottles, etc.

**Entail**', in law, the settlement of an estate by which a freehold is limited to a person and the heirs of his body, with such particular restrictions as the donor may specify. Entailed estates are divided into general and special, the former when the estate is given to the donee and his heirs without exception, the latter when the estate is limited to certain heirs to the exclusion of others.

Entomol' ogy, the branch of zoology which treats of the insects, the name being from Greek entôma, animals "cut in," the transverse division or segmentation of the body being their most conspicuous feature. See Insects.

Entozo'a, a general name for those annulose parasitical animals, which infest the bodies of other animals. Some are found in the intestines, others in the liver, brain, muscles, and other tissues. They pass through different stages in their development, and at each stage occupy a different tissue and usually a different animal. Entre Rios (en'tre  $r\bar{s}$ 'os) ("between rivers"), a province of the Argentine Republic, lying between the Uruguay and the Parana: area est. at 45,000 sq. mi.; pop. 300,000. The province is largely pastoral. Capital Concepcion, with a pop. of 10,000. En'try, in law, the act of taking possession

En'try, in law, the act of taking possession of lands or tenements by entering or setting foot on the same.

En'velopes, the paper covers that enclose letters or notes. They became common shortly after the introduction of the penny postage system; were at first made chiefly by hand, but are now not only shaped, but folded, gummed, etc., by machinery.

**E'ocene**, in geology, a term applied to the lower division of the Tertiary strata, from Gr. eos, dawn, and kainos, recent, because remains of existing organic species first occur here. The Eocene beds are arranged in two groups, termed the lower and Upper Eocene; the strata formerly called Upper Eocene being now known as Oligocene.

Eozo'ic Rocks, the name given to the oldest fossiliferous rocks, such as the Laurentian and Huronian of Canada, from their being supposed to contain the first or earliest traces of life in the stratified systems.

Ep'acris, a genus of monopetalous exogens, the typical genus of the natural order Epacridaceæ, distinguished by having a colored calyx with many bracts, a tubular corolla with smooth limb, stamens affixed to the corolla, and a five-valved, many-seeded capsule. The species are shrubdy plants, with axillary, white, red, or purple flowers, generally in leafy spikes. The order Epacridaceæ consists of Australia. The fruit of some species is eaten under the name of Australian cranberry, and they are cultivated in greenhouses for their flowers.

**Ep'act**, in chronology, the excess of the solar month above the lunar synodical month, and of the solar year above the lunar year of twelve synodical months. The epacts then are annual and menstrual, or monthly. Suppose the new moon to be on January 1: the month of January containing 31 days, and the lunar month only 29 days, 12 hours, 44 minutes, 3 seconds; the difference 1 day, 11 hours, 15 minutes, 57 seconds, is the mentrual epact. The annual epact is nearly 11 days; the solar year being 365 days, and the lunar year 354.

**Epaminon' das** (B. c. 418-362), an ancient Greek hero, who, for a short time, raised his country, Thebes, to the summit of power and prosperity. He took the leading part in the struggle during which Spartan supremacy in Greece was destroyed, and the supremacy of Thebes temporarily secured. Four times he successfully invaded the Peloponnesus at the head of the Thebans.

**Ephem'era**, the typical genus of the insect family Ephemeridæ, Neuropterous insects, so named from the extreme shortness of their lives in the perfect state. They are known as *May-flies* or *day-flies*, and are characterized by the slenderness of their bodies; the delicacy of their wings, which are erect and unequal, the anterior being much the larger; the rudimentary condition of the mouth; and the termination of the abdomen in three filiform appendages. In the state of larvæ and pupæ they are aquatic and exist for years. When ready



Development of the May-fly.

for their final change they creep out of the water, generally toward sunset of a fine summer evening. They shed their whole skin shortly after leaving the water, propagate their species, and die, taking no food in the perfect state.

Eph'esus, an ancient Greek city of Lvdia. in Asia Minor, one of the twelve Ionian cities on the south side of the Caystrus, near its mouth. It was at one time the grand emporium of Western Asia, having a convenient and spacious harbor. The first great temple, begun about B.C. 650 and finished after 120 years, was burned by the notorious Herostratus B.C. 356. A second and more magnificent was then erected, which was burned by the Goths in A.D. 262. Some interesting remains have recently been discovered by excavation. Several church councils were held here, especially the third ecumenical council of 431, at which Nestorius was condemned. The site of the city is now desolate; near it is a poor village, Aiasoluk.

E'phraim, the younger son of Joseph, and the founder of one of the twelve tribes of Israel.

Ep'ic, a poem of the narrative kind. Some authorities restrict the term to narrative poems written in a lofty style and describing the exploits of heroes. Others widen the definition so as to include not only long narrative poems of romantic or supernatural adventure, but also those of a historical, legendary, mockheroic, or humorous character. Epic is distinguished from drama in so far as the author frequently speaks in his own person as narrator: and from lyrical poetry by making the



predominant feature the narration of action rather than the expression of emotion. Among the more famous epics of the world's literature may be noted: Homer's *lkad* and *Odyssey*; Vergil's *Æneid*; the German *Nibelungenited*; the Anglo-Saxon poem of *Beowulf*; the French Song of Roland; Dante's Divina Commedia; Tas-Bo's Gierusalemme Liberata; Ariosto's Orlundo Furioso; Milton's Paradise Lost; Spenser's Fairy Queen; Camoens's Lusiad (Portuguese); and Firdusi's Shah Nameh (Persian). Hesiod's Theogony; the poetic Edda; the Finnish Kalewala; the Indian Mahdbhårata may be described as collections of epic legend. The historical epic has an excellent representative In Barbour's Bruce; and specimens of the mockheroic and humorous epic are found in The Battle of the Frags and Mice; Reynard the Fox; Butler's Hudibras; and Pope's Rape of the Lock.

**Epicte' tus** (60-94), a Greek Stoic philosopher, b. in Phrygia. He lived long at Rome, where, in his youth, he was a slave. Though nominally a Stoic, he was not interested in Stoicism as an intellectual system; he adopted its terminology and its moral doctrines, but in his discourses he appeared rather as a moral and religious teacher than as a philosopher.

Epicu'rus (B.c. 342-270), a Greek philosopher, founder of the Epicurean school, was b. in the island of Samos. He settled at Athens B. C. 306, and established a philosophical school. Here he spent the remainder of his life. His pupils were numerous and enthusiastically devoted to him. His theory of the universe was based on the atomic theory of Democritus. The fundamental principle of his ethical system was that pleasure and pain are the chief good and evil, the attainment of the one and the avoidance of the other of which are to be regarded as the end of philosophy. Peace of mind, based on meditation, he considered as the origin of all good. The philosophy of Epicurus has been violently opposed and frequently misrepresented. In ancient times his philosophy appears to have been more popular in Greece than in Rome, although his disciples were numerous in both. Epicurus was a very voluminous writer, but few of his writings are extant, what we possess comprising only some fragments of a Treatise on Nature, two letters, and detached passages.

Epicycloi dal Wheel, a wheel or ring fixed to a framework, toothed on its inner side, and having in gear with it another toothed wheel of half the diameter of the first, fitted so as to revolve about the center of the latter. It is used for converting circular into alternate motion, or alternate into circular. While the revolution of the smaller wheel is taking place any point whatever on its circumference will describe a straight line, or will pass and repass through a diameter of the circle, once during each revolution. In practise, a piston rod or other reciprocating part may be attached to any point on the circumference of the smaller wheel.

**Epigæa**  $(-j\bar{e}'a)$ , a genus of shrubs of the heath order, characterized by having three leaflets on the outside of the five-parted calyx:

and by the corolla being salver-shaped, fivecleft, with its tube hairy on the inside. The trailing arbutus is the Mayflower of North America.

Epilo'blum, the willow herb, a genus of plants, nat. order Onagracess. The species are herbs or under-shrubs with pink or purple, rarely yellow, flowers, solitary in the axils of the leaves or in terminal leafy spikes. The seeds are tipped with a pencil of silky halrs, and are contained in a long four-celled capsule. There are more than fifty species scattered over the arctic and temperate regions of the world.

**Epimachus,** (e-pim'a-kus), a genus of slender-billed (tenuirostral) birds of the Hoopoe family, resembling the birds of paradise in the exceeding luxuriance and brilliancy of their plumage.

**Epiph'any,** a festival, otherwise called the manifestation of Christ to the Gentiles, observed on January 6 in honor of the adoration of our Saviour by the three magi, or wise men, who came to adore him and bring him presents, led by the star. As a separate festival it dates from \$13.

Ep'iphyte, a plant which grows and flourishes on the trunks and branches of trees, adhering to the bark, as a moss, lichen, fern, etc., but which does not, like a parasite, derive any nourishment from the plant on which it grows. Many orchidaceous plants are epiphytes.

Épi'rus, a country of ancient Greece corresponding to the southern portion of modern Albanla. The most interesting locality in it was Dodona. The inhabitants were only in part Greeks. The Molossians at last acquired the ascendency, and the kings of this tribe took the name of kings of Epirus. The most celebrated king of Epirus was Pyrrhus, who made war upon the Romans. Epirus became a Roman province in 168 B. c., and shared the fortunes of Rome till it was conquered by the Turks.

**Epistemol'ogy**, that department of metaphysics which investigates and explains the doctrine or theory of knowing: distinguished from *ontology*, which investigates real existence or the theory of being.

Ep itaph, an inscription upon a tomb or monument in honor or memory of the dead. Epitaphs were in use both among the Greeks and Romans. The Greeks distinguished by epitaphs only their illustrious men. Among the Romans they became a family institution, and private names were regularly recorded upon tombstones. The same practise has generally prevailed in Christian tombstones epitaphs usually give brief facts of the deceased's life, sometimes also the pious hopes of survivors in reference to the resurrection or other doctrines of the Christian faith, etc.

**Epithe' lium,** in anatomy, the cellular layer which lines the internal cavities and canals of the body, both closed and open, as the mouth. nose, respiratory organs, blood-vessels, etc., and which is analogous to the cuticle of the outer surface. There are several varieties of epithelium.

Epoch (or Era) is a fixed point of time, commonly selected on account of some remarkable event by which it has been distinguished, and which is made the beginning or determining point of a particular year from which all other years, whether preceding or ensuing, are computed. The creation and the birth of Christ are the most important of the historical epochs. The creation has formed the foundation of various chronologies, the chief of which are: 1, The epoch adopted by Bossuet, Ussher, and other Catholic and Protestant divines, which places the creation in B. c. 4004. 2, The Era of Constantinople (adopted by Russia) which places it in B. c. 5508. 3, The Era of Antioch, used till A. D. 284, placed the creation B. c. 5502. 4, The Era of Alexandria, which made the creation B. c. 5492. This is also the Abys-sinian Era. 5, The Jewish Era, which places the creation in B. c. 3760. The Greeks computed their time by periods of four years called Olympiads, from the occurrence every fourth year of the Olympic games. The first Olympiad, being the year in which Coræbus was victor in the Olympic games, was in the year B. C. 776. The Romans dated from the supposed era of the foundation of their city, April 21 in the third year of the sixth Olympiad, or B. c. 753. The Christian Erg, or mode of computing from the birth of Christ as a starting-point was first introduced in the sixth century, and was generally adopted by the year 1000. This event is believed to have taken place earlier, perhaps by four years, than the received date. The Julian epoch, based on the coincidence of the solar, lunar, and indictional periods, is fixed at 4713 B. c., and is the only epoch established on an astro-nomical basis. The Muhammedan Era, or Ilejira, commences on July 16, 622, and the years are computed by lunar months. The Chinese reckon their time by cycles of 60 years. Instead of numbering them as we do they give a different name to every year in the cycle. Epsom Salt, sulphate of magnesium, a ca-

**Epsom Salt**, sulphate of magnesium, a cathartic salt which appears in capillary fibers or acicular crystals. It is found covering crevices of rocks, in mineral springs, etc., but is commonly prepared by artificial processes from magnesian limestone by treating it with sulphuric acid, or by dissolving the mineral *kienerite* in boiling water, allowing the insoluble matter to settle, and crystallizing out the Epsom salt from the clear solution. It is employed in medicine as a purgative, and in the arts. The name is derived from its having been first procured from the mineral waters at Epsom.

Equa tor, that great circle of our globe every point of which is  $00^{\circ}$  from the poles. All places which are on it have invariably equal days and nights. Our earth is divided by it into the northern and southern hemispheres. From this circle is reckoned the latitude of places both north and south. There is also a corresponding celestial equator in the plane of the terrestrial, an imaginary great circle in the source of the terrestrial.

the heavens the plane of which is perpendicular to the axis of the earth. It is everywhere  $90^{\circ}$  distant from the celestial poles, which coincide with the extremities of the earth's axis, supposed to be produced to meet the heavens. During his apparent yearly course the sun is twice in the celestial, and vertically over the terrestrial equator, at the beginning of spring and of autumn. Then the day and night are equal all over the earth, whence the name equinox. The magnetic equator is a line which pretty nearly coincides with the geographical equator, and at every point of which the vertical component of the earth's magnetic attraction is zero; that is to say, a dipping needle carried along the magnetic equator remains horizontal. It is hence also called the *aclinic line*.

Equato' rial, an astronomical instrument contrived for the purpose of directing a telescope upon any celestial object, and of keeping the object in view for any length of time. notwithstanding the diurnal motion of the earth. For these purposes a principal axis resting on firm supports is mounted exactly parallel to the axis of the earth's rotation, and consequently pointing to the poles of the heavens, being fixed so as to turn on pivots at its extremities. To this there is attached a telescope moving on an axis of its own in such a way that it may either be exactly parallel to the other axis, or at any angle to it; when at right angles it points to the celestial equator. By this means a star can be followed by one motion from its rising to its setting. In some observatories the equatorials have the necessary motion given them by clock-work.

**Equestrian Order**, the order of "Knights" in ancient Rome. The *equites* or knights originally formed the cavalry of the army. They are said by Livy to have been instituted by Romulus, who selected 300 of them from the three principal tribes. About the time of the Gracchi (123 B. C.) the equites became a distinct order in the state, and the judges and the farmers of the revenue were selected from their ranks. They held their position in virtue of a certain property qualification, and toward the end of the republic they possessed much influence in the state.

Equidæ, the horse family, a family belonging to the order Ungulata, or hoofed mammals, and subdivision Perissodactyla, characterized by an undivided hoof formed of the third toe and its enlarged horny nail, a simple stomach, a mane on the neck, and by six incisor teeth on each jaw, seven molars on either side of both jaws, and by two small canne teeth in the upper jaw of the males and sometimes in both jaws. It is divided into two groups—one including the asses and zebras. the other comprising the true horses.

Equinoc'tial, in astronomy, the circle in the heavens otherwise known as the celestial equator. When the sun is on the equator there is equal length of day and night over all the earth; hence the name equinoctial. Equinoctial gales, storms which are observed generally to take place about the time of the sun's crossing the equator, that is, at the vernal and autumnal equinox, in March and September. *Equinoctial points* are the two points wherein the celestial equator and ecliptic intersect each other; the one, being in the first point of Aries, is called the *rernal* point; and the other, in the first point of Libra, the *autumnal* point. These points are found to be moving backward or westward at the rate of 50" of a degree in a year. This is called the precession of the equinoxes.

E'quinox, the precise time when the sun enters one of the equinoctial points, or the first point of Aries about the 21st of March, and the first point of Libra about the 23d of September, making the day and night of equal length all over the world. At all other times the lengths of the day and of the night are unequal, their difference being the greater the more we approach either pole, while in the same latitude it is everywhere the same.

Eq'uity, in law, the system of supplemental law administered in certain courts, founded upon defined rules, recorded precedents, and established principles, the judges, however, liberally expounding and developing them to meet new exigencies. While it aims to assist the defects of the common law, by extending relief to those rights of property which the strict law does not recognize, and by giving more ample and distributive redress than the ordinary tribunals afford, equity by no means either controls, mitigates, or supersedes the common law, but rather guides itself by its analogies, and does not assume any power to subvert its doctrines. Courts of equity grant redress to all parties where they have rights, ex aquo et bono, and modify and fashion that redress according to circumstances. They bring before them all the parties interested in the subject matter of the suit, and adjust the rights of all

Equity of Redemption, in law, the advantage allowed to a mortgager of a reasonable time to redeem an estate mortgaged, when it is of greater value than the sum for which it is mortgaged.

**Erard,** SEBASTIEN (1752-1831), a celebrated musical instrument maker. He went to Paris at the age of eighteen, and in concert with his brother, Jean Baptiste, produced pianofortes superior to any that had previously been made in France.

**Erasis' tratus,** an ancient Greek physician. He lived in the third century before the Christian era, and was the first who systematically dissected the human body. His description of the brain and nerves is much more exact than any given by his predecessors.

**Éras' mus**, DESIDERIUS (1467-1536), a Dutch scholar, b. at Rotterdam. In 1402 he went to Paris to perfect himself in theology and polite literature. In 1510 he wrote his *Praise of Foldy* while residing with Sir Thomas More, and was appointed Margaret professor of divinity and Greek lecturer at Cambridge. In 1514 he returned to the Continent, and lived chiefly at Basel, where he died.

Eras' tus, the learned name of Thomas Lie-

ber (1523-1584), a Swiss physician, who maintained the opinions from which the well-known epithet of *Erastian*, as now used, is derived. He was successively professor of medicine at Heidelberg, and of ethics at Basel. He maintained in his writings the complete subordination of the ecclesiastical to the secular power; and that the church had no right to exclude any one from church ordinances, or to inflict excommunication.

**Er'ato**, in Greek mythology, one of the Muses, whose name signifies loving or lovely. She presided over lyric and especially amatory poetry.

**Eratos' thenes,** (B. c. 276–194), an ancient Greek astronomer, born at Cyrene, in Africa; was librarian at Alexandria, and gained his greatest renown by his investigations of the size of the earth. He rendered much service to the science of astronomy, and first observed the obliquity of the ecliptic.

Erckmann-Chatrian (shåt-ri-än), the joint name of two French-Alsatian writers of fiction. Emile Erckmann, born at Pfalzburg, 1822, studied law at Paris. Alexandre Chatrian, born at Soldatenthal, near Pfalzburg, 1826, was for some time teacher in the Pfalzburg College. They formed a literary partnership in 1847, but it was not till the appearance of L'Ilustre Docteur Mathéus in 1850 that success attended them.

**Er'ebus,** in Greek mythology, the son of Chaos and Darkness. The name Erebus was also given to the infernal regions.

**Erebus**, Mount, a volcano of the Antarctic regions in S. Victoria Land; height 12,400 ft.

**Erectheus** (e-rek'thūs), in Greek mythology, a personage associated with the early history of Athens, and to whom a fine temple was built on the Acropolis.

Er'furt, an important town in the Prussian province of Saxony. It has a fine cathedral dating from the thirteenth century, and several handsome Gothic churches. The university, founded in 1378 and suppressed in 1816, was long an important institution. There are still a royal academy of science and a royal library with 60,000 vols. The monastery (now an orphanage) was the residence of Luther from 1501 to 1508. The industries are varied, including clothing, machinery, leather, shoes, ironmongery, chemicals, etc. Pop. 58,385.

Er'got, the altered seed of rye and other grasses caused by the attack of a fungus. The seed is replaced by a dense homogeneous tissue largely charged with an oily fluid. In its perfect state this germinates and produces the claviceps. When diseased rye of this kind is eaten in food for sometime, it sometimes causes death by a kind of mortification called dry gangrene.

Eric, the Red, a Norwegian navigator, who located in Iceland in 982. He sailed from Brediflord in 983 to reach some western shore visited by one of his countrymen in former times. The land which he found he called Greenland. In 985 he returned to Iceland, where he so interested the people in his discovery that they organized a fleet of twenty sail for a new voyage. Some of the ships were lost in a storm, but he succeeded in reaching the Greenland coast with fourteen, and located on

the flord at some distance from the ocean. His son Lief, twelve years later. is said to have discovered the continent of North America, which he called Markland an d Finland.

Erica(e-ri'ka), the heath, a large genus of branched, rigid shrubs, type of the nat. order Ericaceæ, most of which are natives of South Africa, a few being found in Europe and Asia. The

Ergot of Bye. A sia. The leaves are narrow and rigid, the flowers are globose or tubular, and four-lobed.

Ericacceæ, a nat. order of oxogenous plants. Er'icsson, JOHN (1803-1889), engineer, b. in Sweden. He served for a time in the Swedish Army; removed to London in 1826, and to New York in 1839. He is identified with numerous inventions and improvements on steam machinery and its applications. His chief inventions are his caloric engine, the screw propeller (1836), which has revolutionized navigation, and his turret ships, the first of which, the Monitor, distinguished itself in the American Civil War, and inaugurated a new era in naval warfare. He latterly devoted himself to studies of the earth's motion and the intensity of solar heat.

**Erie** ( $\overline{e}$ ' ri), one of the great chain of North American lakes, between Lakes Huron and Ontario, about 265 mi. long. 634 mi. broad at its centre, from 40 to 60 fathoms deep at the deepest part; area 9,600 sq. mi. The whole of its southern shore is within the territory of the U. S., and its northern within that of Canada. It receives the waters of the upper lakes by Detroit River at its southwestern extremity, and discharges its waters into Lake Ontario by the Niagara River at its northeast end. The Welland Canal enables vessels to pass from it to Lake Ontario. It is shallow compared with the other lakes of the series, and is subject to violent storms. The principal harbors are Buffalo, Erie, Cleveland, etc.

Erie, a city, Pennsylvania, an important railway and commercial center on the southern shore of Lake Erie. There are numerous iron works (including foundries, rolling mills, blast furnaces, etc.), petroleum refineries, breweries, tanneries, wood working factories, etc. The harbor is one of the best on the lake. Pop. 40,634. Eric Canal, the largest in the U. S., serving to connect the great lakes with the sea. It begins at Buffalo on Lake Erie, and extends to the Hudson at Albany. It is 363 mi. long; has in all 72 locks; a surface width 70 ft., bottom width 42 ft., and depth 7 ft. It is carried over several large streams on stone aqueducts: cost nearly \$10,000,000, and was opened in 1825. The navigation is free.

Eriom eter, an optical instrument for measuring the diameters of minute particles and fibers, from the size of the colored rings produced by the diffraction of the light in which the objects are viewed.

**Eris**, in the Greek mythology, the goddess of discord. Not being invited to the marriage of Peleus, she revenged herself by means of the *apple of discord*.

**Ér'ivan**, a Russian town, capital of government of the same name in the lieutenancy of the Caucasus, on the Sanga, north of Mount Ararat. It has a citadel, barracks, a cannon foundry, and some manufactures. Pop. 12,505. The government has an area of 10,705 sq. mi., and a pop. of 583,957.

Er mine, the stoat, a quadruped of the weasel tribe, found over temperate Europe, but commonly in the north. In consequence of the change that occurs in the color of its fur at different seasons—by far most marked in the Arctic regions—it is not generally known that the ermine and stoat are the same. In winter,



Ermine.

in cold countries or severe seasons, the fur changes from a reddish brown to a yellowish white, or almost pure white, under which shade the animal is recognized as the ermine. In both states the tip of the tail is black. Like many other species of this genus the ermine has the faculty of ejecting a fluid of a musky odor. Its fur is short, soft, and silky: the best skins being brought from Russia. Sweden, and Norway, and Hudson's Bay territories. It was formerly one of the insignia of royalty, and is still used by judges. When used as linings of cloaks the black tuft from the tail is sewed to the skin at irregular distances.

Erne, Lough, a lake, Ireland, county Fermanagh, consisting of a north or lower, and a

south or upper lake, connected by a narrow, winding channel, and properly forming only expansions of the river Erne. Its entire length is about 40 mi.; average breadth 6 mi. It contains numerous small islands, and is well stocked with fish. The river Erne rises in Lough Gounagh, in the county of Longford, flows through Loughs Oughter and Erne, and falls into Donegal Bay below Ballyshannon. Length, 72 mi.

**Erosion Theory,** in geology, the theory, now held by all geologists, that valleys are due to the wearing influences of water and ice, the latter chiefly in the form of glaciers, as opposed to the theory which regards them as the result of fissures in the earth's crust produced by strains during its upheaval.

Errat'ics (or erratic blocks), in geology, boulders or large masses of angular rock which have been transported to a distance from their original mountains by the action of ice during the glacial period. Thus on the slopes of the Jura Mountains immense blocks of granite are found which have traveled 60 mi. from their original situation. Similarly masses of Scotch and Lake district granites and of Welsh rocks occur not uncommonly in the surface soil of the Midland counties of England.

Erskine, THOMAS, Lord Erskine (1750-1823), Scottish lawyer, the youngest son of the tenth earl of Buchan. He was educated partly at the high school of Edinburgh, and partly at the University of St. Andrews. After serving four years in the navy and seven in the army he commenced the study of law, and in 1778 both took his degree at Cambridge and was called to the bar. His success was immediate. In 1783 he was elected member of Parliament for Portsmouth, a seat he held till 1806, when he was raised to the peerage. In 1789 he defended Mr. Stockdale, a bookseller, for publishing what was charged as a libelous pamphlet in favor of Warren Hastings. In 1792, being em-ployed to defend Thomas Paine, when prosecuted for the second part of his Rights of Man, he declared that, waiving all personal convictions, he deemed it right, as an English advocate, to obey the call; by the maintenance of which principle he lost his office of attorney general to the Prince of Wales. In the trials of Hardy, Tooke, and others for high treason in 1794, which lasted for several weeks, the ability displayed by Erskine was acknowledged by all parties. 1802 the Prince of Wales made him keeper of his seals for the duchy of Cornwall. In 1806 he was created a peer, and raised to the dignity of lord chancellor.

**Eruptive Rocks,** in geology, those which, like lava, bassalt, granite, etc., have broken through other rocks while in a molten state.

**Eryn'go**, a genus of plants belonging to the natural order of Umbelliferæ. There are upward of 100 species found in the temperate and sub-tropical climates, but chiefly in South America. An American species is known by the name of rattlesnake weed.

**Erythræ'a**, a genus of annual herbs, of which *Centaury* is the best known species.

Erzerum (Erzeroum, or Erzeroom) (er'ze-

röm), a city of Turkish Armenia, capital of a vilayet with an area of 27,000 sq. mi., and a pop. of 582,745. The town is about 6,000 ft. above sea level, forms an important strategical center, and has become a principal frontier fortress. In addition to important manufactures, especially in copper and iron, it carries on an extensive trade, and is a chief halting place for Persian pilgrims on their way to Mecca. Pop. 38,894.

**Erzgebirge** (erts'ge-bir-ge) ("Ore Mountain"), a chain of European mountains forming a natural boundary between Saxony and Bohemia, nearly 120 mi. in length and 25 mi. broad. The highest summits, which are on the side of Saxony, rise to 3,800 or 3,900 ft. The mountains are rich in silver, iron, copper, lead, cobalt, arsenic, etc.

**E'sau**, the eldest son of Isaac, and twin brother of Jacob. 'The story of his marriage, of his loss of birthright through the craft of Rebekah and Jacob, and of his quarrel and reconciliation with Jacob, are told in the book of Genesis. He was the progenitor of the Edomites, who dwelt on Mount Seir.

**Escanaba**, Delta co., Mich., on Little Bay, 121 mi. n. of Green Bay. Railroad, C. & N. W. Industries: woodenware factory, iron foundry. Is the outlet of a mining district w. and n. and headquarters of Peninsula division C. & N. W. Ry. Was first settled in 1863 by employees of railway company and became a city in 1883. Pop. est. 1897, 8,200.

Escape'ment, the general contrivance in a timepiece by which the pressure of the wheels (which move always in one direction) and the vibratory motion of the pendulum or balancewheel are accommodated the one to the other. By this contrivance the wheelwork is made to communicate an impulse to the regulating power (which in a clock is the pendulum and in a watch the balance wheel), so as to restore to it the small portion of force which it loses in every vibration, in consequence of friction and the resistance of the air. The leading requisite of a good escapement is that the impulse communicated to the pendulum or balance wheel shall be invariable, notwithstanding any irregularity or foulness in the train of wheels. Various kinds of escapements have been contrived, some of which are shown in the accompanying figure.

Es'car (Es'kar), a late geological formation in the superficial drift, generally consisting of a long, linear ridge of sand and gravel, including pieces of considerable size. The materials are derived from the waste of till or boulderclay, and their arrangement took place probably under water over which icebergs floated, for in Sweden particularly angular, erratic blocks are often deposited on the *escar*.

**Escheat** (es-chēt), in law, a species of reversion arising from default of heirs or by forfeiture. That which falls or lapses to the original proprietor, or to the state, as lands or other property. By modern legislation there can be no escheat on failure of the whole blood wherever there are persons of the half-blood capable of inheriting.



# Escurial

**Escu'rial**, a remarkable building in Spain, comprising at once a palace, a convent, a church, and a mausoleum. It is distant from

# Esparto

oblique, and yellow and brownish skin. Sealskins, reindeer, and other furs are used as materials for dress, according to the season, as



Eskimo Winter Station, Greenland.

Madrid about 24 mi. in a northwesterly direction, and situated on the acclivity of the Sierra Guadarrama, the range of mountains which divides New from Old Castlle. It was built by Philip II, and dedicated to St. Lawrence, in commemoration of the victory of St. Quentin, fought on the festival of the saint in 1557. It is popularly considered to be built on the plan of a gridiron, from the fact that St. Lawrence is said to have been broiled alive on a sort of large gridiron. It was begun in 1563 and finished in 1584. The church is the finest portion of the whole building. The dome is 60 ft. in diameter, and its height at the center is about 320 ft. The library contains a valuable collection. The Escurial was partly burned in 1671. It was restored by Ferdinand VII, but the monks, with their revenues which supported it, have long since disappeared. In 1872 it was fired by lightning, and suffered serious damage.

**Esdrac'ion**, PLAIN OF, a plain extending across Palestine from the Mediterranean to the Jordan, and drained by the river Kishon.

**Eskimo**, a race inhabiting the Arctic coasts of North America, from Greenland to Bering's Strait, and extending into Asia. They call themselves *Inv-it*, the people; their other name is from an Algonquin word signifying eaters of raw flesh. They consist of three principal stocks—the Greenlanders; the Eskimo proper, in Labrador; and the Western Eskimo, found along Hudson's Bay, the west side of Baffin's Bay, the polar shores as far as the mouths of the Coppermine and Mackenzie rivers, and both on the American and Asiatic sides of Bering's Strait. Their leading physical peculiarities are a stunted stature, flattened nose, projecting check-bones, eyes often well as skins of otters, foxes, martens, etc. In summer they live in tents, covered with skins; in winter they may be said to burrow beneath the snow. In Greenland, houses built of stone and cemented with turf are used as permanent habita-tions. Vegetation being extremely stunted within the limits of their territories. their food consists of the flesh of whales, seals, wal-rus, etc., often eaten raw: and they show remarkable skill in fishing and hunting. Their weapons are bows and arrows, spears or lances, generally pointed with bone. but sometimes with metal. Their only domestic animal is the Eskimo dog. In in-tellect they are by no means deficient; in manners they are kind and hospitable. Their religious ideas appear

scanty, but success has attended the labors of the Danish missionaries in teaching them the Christian religion.

Eskimo Dog (or Esquiman Dog), a breed of dogs extensively spread over northern regions of America and Eastern Asia. It is rather larger than the English pointer, but appears less on account of the shortness of its legs. It



Eskimo Dog.

has oblique eyes, an elongated muzzle, and a bushy tail, which give it a wolfish appearance. The color is generally a deep dun, obscurely barred and patched with darker color. It is the only beast of burden in these latitudes, and with a team of such dogs attached to his sledge the Eskimo will cover 60 mi. a day for several successive days.

Espar'to, a plant growing in Spain and North Africa, long applied to the manufacture of cordage, matting, etc., and now er-

tensively employed for paper-making. This plant is a species of grass 2 to 4 ft. high, covering large tracts in its native regions, and also cultivated, especially in Spain. Formerly the supply of esparto was almost wholly obtained from Spain, but it is now obtained in still larger quantity from Algeria (where it is called *alfa*), and from Tripoli and Tunis. The paper made from it is excellent; it may be also reduced to a fibrous state and used for stuffing mattresses, etc.

**Espir'ito-Santo** ("Holy Spirit"), a maritime province, Brazil, bounded n. by Bahia, s. by Rio de Janeiro; length about 260 mi.; breadth, about 120 mi.; area 43,290 sq. mi.; pop. 100,-717.

**Espir' itu-Santo**, an island of the Pacific, the largest of the New Hebrides, with some 20,000 inhabitants.

**Esquimault** (es-kēmālt), a harbor and naval station on the s. e. coast of Vancouver Island, about 3 mi. from Victoria, the capital of British Columbia. The harbor is almost landlocked, and with the "Royal Roads" outside, is capable of giving safe anchorage to a fleet of vessels of the largest size.

Essen, a town of Rhenish Prussia, 18 mi. n.e. of Düsseldorf, founded in the ninth century, and adorned with a fine church dating from 873. It has recently increased with great rapidity, and is celebrated for the steel and iron works of Krupp, the most extensive in Europe, employing about 20,000 workmen. This great establishment was started in 1827, with only two workmen. The works occupy 1,000 acres, and the firm possesses coal and iron-stone mines. The rifled steel cannon made here are supplied to most of the armises of Europe. In the Krupp works there is now a steam hammer of 150 tons. Pop. 65,064.

**Essential Oils**, volatile oils usually drawn from aromatic plants by subjecting them to distillation with water, such as the oils of lavender. cloves, peppermint, etc.

**Essequibo** (es-se-kē-bō), a river of British Guiana which flows into the Atlantic by an estuary 20 mi. in width after a course of about 450 mi. The district or division of Essequibo is well cultivated and extremely fertile, producing coffee, cotton, cocoa, and sugar. Pop. 36.000.

**Essex**, a maritime county in the s.e. of England, area 987,032 acres. The soil is generally extremely fertile, and particularly well adapted for the growth of wheat. On the coast are some valuable oyster-beds, the oysters from which are exported in considerable quantities. The manufactures of the county are not very extensive, the chief being, crape, silks, straw plait, etc. The chief towns are Chelmsford, the county town, West Ham, Colchester, Malden, and Harwick. Pop. 785,399.

den. and Harwick. Pop. 785,399. Essex, ROBERT DEVEREUX, second earl of (1567-1601). In 1596 he was commander of the troops in an expedition against Spain, and distinguished himself by the capture of Cadiz. In an expedition next year he was less fortunate, and the queen, with whom he was always quarreling, received him coldly. He was appointed lord lieutenant of Ireland in 1599. Later he returned to England and was executed for treason.

Esslingen (es'ling-èn), a town of Germany, in Würtemberg, on the Neckar, 7 mi. e.s.e. of Stuttgart. It is of Roman origin, was long an imperial free town, has walls flanked with towers, a castle, and an ancient Gothic church, with a tower 230 ft. high. It has manufactures of machinery, articles of wood, cutlery, philosophical instruments, spinning and other mills, etc. Pop. 20,865.

**Este** (es'tā), one of the most ancient and illustrious families of Italy. In the eleventh century the house of Este became connected by marriage with the German Welfs, or Guelphs, and founded the German branch of the house of Este, the dukes of Brunswick and Hanover.

**Esterha'zy**, a family of Hungarian magnates, whose authentic genealogy goes back to the first half of the thirteenth century.

Esther, a Jewess who became the queen of Ahasuerus, king of Persia, and whose story is told in the book of the Old Testament called by her name. This book is supposed by some to be the composition of the uncle of the heroine. Various opinions are held regarding the time and truth of the story; but the feast of Purim which commemorates the events narrated is still observed by the Jews during the month Adar.

**Esthonia**, a maritime government of Russia. About a fourth of the surface is covered with forests of pine, birch, and alder. The crops include a little wheat, much barley and oats, and some flax, hops, and tobacco. Cattle are reared, and active fisheries are carried on. The peasantry are almost all of Finnish origin, and speak a Finnish dialect. In the tenth and twefth centuries it belonged to Denmark; it was afterward annexed by Sweden, and in 1710 was seized by Russia. Revel is the capital. Pon. 379.875.

the capital. Pop. 379,875. Estop'pel, in law, anything done by a party himself, which puts a period to an action by closing the ground of controversy.

**Esto'vers**, in law, necessaries or supplies. Common of Estorers is the liberty of taking the necessary wood for a house or farm from another's estate.

**Estremadu'ra**, a western division of Spain, consisting of the provinces of Badajoz and Caceres. It is fertile, but not cultivated to its full extent. The Tagus and Guadiana intersect it east to west. Immense flocks of sheep graze on the rich plains. The area is about 16,700 sq. mi. and the pop. 789,123.

**Estremadura**, a maritime province of Portugal, divided by the Tagus into two nearly equal parts, of which the northern is the more mountainous. Wines and olives are the principal produce. The principal city is Lisbon. Area 6,876 sq. mi.; pop. 946,472.

**Etæ** rio (Éterio), in bot. a collection of distinct indehiscent carpels, either dry upon a fleshy receptacle as the strawberry, or dry upon a dry receptacle as the ranunculus, or fleshy upon a dry receptacle as the raspberry, the parts being small drupes. Eta'wah, a town, Hindustan, N. W. Provinces, capital of the district of same name, on left bank of the Jumna, picturesquely situated among ravines, and richly planted with trees. It has some good buildings, and a considerable trade. Pop. 34,721. The district has an area of 1.694 sq. mi., and a pop. of 722,371.

Etching, the art of producing designs upon a plate of steel or copper by means of lines drawn with an *etching needle* (a fine-pointed steel tool), the lines being drawn through a coating or varnish (the ground), and bitten in by some strong acid which can only affect the plate where the varnish has been removed. See Engraving and Zincography.

See Engraving and Zincography. Etc'sian Winds, winds blowing at stated times of the year; applied especially to northerly and northeasterly winds which prevail at certain seasons in the Mediterranean regions.

Eth'elbert, king of Kent (500-616), succeeded his father and reduced all the Anglo-Saxon states, except Northumberland, to the condition of his dependents. Ethelbert'married Bertha, the daughter of Caribert, king of Paris, and a Christian princess, an event which led indirectly to the introduction of Christianity into England by St. Augustine.

**Ethelbert**, king of England, son of Ethelwulf, succeeded to the government of the eastern side of the kingdom in 857, and in 860, on the death of his brother Ethelbald, became sole king.

Eth'eired I, king of England, son of Ethelwulf, succeeded his brother Ethelbert in 866. The Danes became so formidable in his reign as to threaten the conquest of the whole kingdom.

Etheired II (968-1016), king of England, son of Edgar, succeeded his brother, Edward the Martyr, in 978, and, for his want of vigor and capacity, was surnamed *the Unready*. In his reign began the practise of buying off the Danes by presents of money. After repeated payments of tribute he effected, in 1002, a massacre of the Danes; but this led to Sweyn gathering a large force together and carrying fire and sword through the country. They were again bribed to depart; but, upon a new invasion, Sweyn obliged the nobles to swear allegiance to him as king of England; while Ethelred, in 1013, fled to Normandy. On the death of Sweyn he was invited to resume the government, and died at London in the midst of his struggle with Canute.

Eth elwulf, king of England, succeeded his father, Egbert, about 837; d. 857. His reign was in great measure occupied in repelling Danish incursions; but he is best remembered for his donation to the clergy, which is often quoted as the origin of the system of tithes.

**E** ther, a hypothetical medium of extreme tenuity and elasticity supposed to be diffused throughout all space (as well as among the molecules of which solid bodies are composed), and to be the medium of the transmission of light and heat.

**Ether,** in chem. a very light, volatile, and inflammable fluid, produced by the distillation of alcohol with sulphuric acid. It is lighter

Ethics, otherwise called Moral Philosophy or Moruls, is the science which treats of the nature and laws of the actions of intelligent beings, considered as to whether they are right or wrong, good or bad. The science is more or less closely connected with theology, psychology, politics, political economy, and jurisprudence, but what most strictly belongs to it is the investigation of the principles and basis of duty or the moral law, and an inquiry into the nature and origin of the faculty by which duty is recognized. Various answers have been given to the question why we call an action good or bad, such as that it is consistent or not with the will of God, or with the nature of things, or with the greatest happiness of the greatest number, or that an inward faculty decides it to be such or such; and a great variety of ethical systems have been proposed. The foundations of the leading systems were laid in antiquity, the names of Socrates, Plato, Aristotle, Epicurus, the Cynics and the Stoics being especially prominent. The introduc-tian of Christianity brought a new element into ethical speculation, and among Christians ethics were intimately associated with theology, and morality was regarded as based on and regulated by a definite code contained in the sacred writings. The speculations of Greeks were not, however, disregarded, and some of the ablest Christian moralists (as Augustine, Peter Lombard, Erigena, Anselm, Aquinas, etc.) endeavored to harmonize the Greek theories with the Christian dogmatics. Most modern ethical systems consider the subject as apart from theology as based on independent philosophical principles, and they fall into one of two great classes-the utilitarian systems, which recognize as the chief good, happiness, or the greatest possible satisfaction of the tendencies of our nature; and the rationalistic systems, which recognize that ideas of law and obligation can have their source only in rea-The first of the modern school in Engson. land was Hobbes (1588-1679). Among subse-quent names are those of Cudworth, Locke, Clarke, Shaftesbury, Butler, Hutcheson. Hume, Adam Smith, Reid, Paley, J. S. Mills. Butler, Hutcheson. Herbert Spencer. Another theory of ethics places the moral principle in the sentimental part of our nature, that is, in the direct sympathetic pleasure or sympathetic indignation we have with the impulses which prompt to action or expression. By means of this theory, Adam Smith explains all the phenomena of the moral consciousness. In considering the systems which recognize that the ideas of law and obligation can have their source only in reason, the question, "what is the source of the laws by which reason governs?" gives rise to a number of psychological theories, among which we may notice Clarke's view of the moral principles, as rational institutions or

axioms analogous to those of mathematics; Butler's theory of the natural authority of conscience; the position of Reid, Stewart, and other members of the later intuitional school, who conceive a moral faculty implanted in man which not only perceives the "rightness" or "moral obligation" of actions, but also impels the will to perform what is seen to be right. Very similar as far as classification goes, is the position of Kant, who holds that reason recognizes the immediate obligation of certain kinds of conduct, and that an action is only good when done from a good motive, and that this motive must be essentially different from a natural inclination of any kind.

Ethiopia (or Æthiopia), in ancient geography the country lying to the south of Egypt, and comprehending the modern Nubia, Kordofan, Abyssinia, and other adjacent districts; but its limits were not clearly defined. In ancient times its history was closely connected with that of Egypt, and about the eighth century B. C. it imposed a dynasty on Lower Egypt, and acquired a predominant influence in the valley of the Nile. In the sixth century B.C. the Persian Cambyses invaded Ethiopia; but the country maintained its independence till it became tributary to the Romans in the reign of Au-Subsequently Ethiopia came to be gustus. the designation of the country now known as Abyssinia, and the Abyssinian monarchs still call themselves rulers of Ethiopia.

The Ethiopian Language, or more accurately the Geez language, is the old official and ecclesiastical language of Abyssinia, introduced into that kingdom by settlers from South Arabia. It is a Semitic language resembling Aramaic and Hebrew as well as Arabic. It has a Christian literature of some importance. The principal work is a translation of the Bible, including the Old and New Testaments and Apocrypha. The language is to some extent represented by the modern dialects of Tigre, and by that spoken by some nomadic tribes of the Soudan.

**Ethiops Mineral**, the black sulphide of mercury, prepared by rubbing mercury and sulphur together, either hot or cold.

Ethnol'ogy and Ethnog'raphy, sciences treating of man, the former analyzing the social phenomena of mankind as shown in their customs, languages, institutions, etc.; the latter being more concerned with descriptive details and the orderly collection of facts relating to particular tribes and localities. Besides these terms there is the term Anthropology, used by some to indicate the general science or natural history of mankind, of which the other two are parts. Here we can only give a few particulars bearing on the strictly ethnological and ethnographic divisions of the subject. The unity or plurality of species of the human race is a question that has given rise to much discussion. The most common view in the past has probably been that which regards all mankind as descended from Adam and Eve, attributing the great differences exhibited by different races to climate and other causes acting for a long period of time. Many have

held that such differences were not to be so accounted for, and that the various typical races of the earth were not descended from a single pair, but were separately created in separate localities. Darwin has shown how an accumulation of differences amounting to the appearance of a distinct species may arise from the continual modifications of a single primordial form. Certainly among men the variability of the same race under different climatic conditions is very striking. Even within a comparatively small period of time physical surroundings have induced typical differences between the lithe, sparely-fleshed Yankee of New England, and the plump, rosy-cheeked Englishman; and the Boer of South Africa. with its dry climate, has developed a type as decidedly different from his original stock in moist Holland. The theory of the development of the human race from a single species demands a vast duration of time; and the flint implements discovered intermingled with remains of the mammoth and other extinct animals have proved that man was a contemporary of the mammoth, the cave-bear, and other mammalia of the geological period antecedent to our own, though how distant that period was, as measured by thousands of years, it is difficult to say. Another interesting point is in regard to the first home of the human race. This of course is quite uncertain, but probably it was either in Western Asia or in Africa, and we may naturally conclude that where the mammalia of the highest characteristics appear there was the possible birthplace and center of distribution of mankind.

When we attempt to classify mankind we can scarcely find any one physical characteristic belonging exclusively to a single race. At most we can only say that certain characteristics are the preponderant ones in certain races. In seeking racial characteristics ethnologists make use of various principles of classification. Some give the first place to the shape of the head. Camper, the Dutch anatomist, was the first who attempted to make a scientific distinction of races on this principle, taking as the basis of measurement the amount of the facial angle. But Camper's method, though it illustrates excellently the great differences which exist, between, say, the an-thropoid apes with an angle of 42<sup>-</sup>, the African negro with an angle of 70°, and the European with an angle of 80°, is without certainty, it being possible to find in the population of a single, large town as wide variations of the facial angle as exist between distinct races. Camper's method was therefore superseded by the method of Blumenbach, which is based on consideration of all the chief distinctions in the shape of the head according to which he classified the human family into five varieties: the Caucasian, Mongolian, Ethiopian, Malay, and American. These five varieties were cut down to three by Cuvier, who treated the Malay and American as subdivisions of the Mongolian; and extended by Doctor Prichard, who divided the Caucasian class into a Semitic and an Aryan, or Indo-European class. Lath-

am's classification was into 1, Mongolidæ (Chinese, Turks, Malays, American races, etc.); 2, Atlantidæ (African races, Jews and Arabs); 3, Japetidæ (Indo-Europeans). Among the latter attempts made to find a new principle of classification we may mention that of Retzius, based on the relative length and breadth of the skull, according to which mankind are divided into long-skulled and short, broad-skulled races. Later developments of craniology have introduced a third class, representing a mean between the other two. The capacity of the brain cavity is also a favorite method with some ethnologists. Here the European stands highest with 92.1 cubic in.; the Australian lowest with 81.7. The character of hair and color of skin has also been used by Huxley as the basis of his classification, which divides mankind into 1, Ulutrichi, crisp or woolly haired people with yellow or black skin, comprising Negroes, Bushmen, and Malays: 2. *Leiotrichi*, smooth-haired peo-ple, subdivided into Australioid, Mongoloid, Xanthochroic (fair whites), and Melanochroic (dark whites) groups. But many ethnologists hesitate to accept a classification which brings together nations apparently unrelated, such as the Australians, the ancient Egyptians, and the tribes of Southern India. On the other hand, the character of the hair is found to be one of the surest tests in separating neighboring races, such as the Papuan, and the Malayan, and Australian tribes. Oscar Peschel's classification, based on a number of different particulars, such as the shape of the skull, the color of the skin, the nature and color of the hair, the shape of the features,

etc., is as follows:— 1. The Australians.—Characters: skull of the "long-skulled" type, the jaws being also protruded. The nose is narrow at the root, widening greatly below. The mouth is wide and unshapely. The body is thickly covered with hair; the hair is black, elliptical in section, that on the head being frizzly, and standing out so as to form a shaggy crown. The color of the skin is dark as a rule, sometimes black, though a light copper-red also occurs.

though a light copper-red also occurs. 2. The Pupuans.—This race, which is the one most closely allied to the Australians, occupies New Guinea, New Caledonia, the Solomon Islands, New Hebrides, the Fiji Islands, etc. The most distinctive mark is their peculiarly flattened and abundant hair, growing in tufts, and forming a spreading crown round the head. The skin is always dark, the skull high and narrow; the jaws protruded; the lips fleshy and somewhat swollen; the nose hooked somewhat after the Jewish type. 3. The Mongoloid Nations.—To this race be-

3. The Mongoloid Nations.—To this race belong the Polynesian and Asiatic Malays, the people of Southeastern and Eastern Asia, the Thibetese, all the Northern Asiatics, with their kinsmen in Northern Europe, and lastly the aboriginal population of America. The common characteristics are: long, straight hair, circular in section: almost complete absence of beard and body hair; skin dark-colored, varying from leather-yellow to deep brown, sometimes inclining to red; prominent cheekbones, and eyes in general set obliquely. The various members of the Mongoloid race may be classed under the following subdivisions: (a) The Malay race, comprising the Malays of Malacca, Sumatra, Java, etc.; the inhabitants of Madagascar, the New Zealanders, the natives of the Sandwich Islands, etc. (b) Southern Asiatics with monosyllabic languages, comprising the Chinese, Indo-Chinese (Burmese, Siamese, Anamese, etc.), Thibetese, etc. (c) Coreans and Japanese. (d) Northern Mongoloids of the Old World, comprising the true Mongols, Turks, Finns, Lapps, Magyars, Bulgarians, etc., all much resembling the Chinese and Indo-Chinese group in physical characters. (c) Northern Nations of doubtful position: The Yenisei Ostiaks, the Ainos of Yesso, the inhabitants of Saghalien, etc. (f) The Bering's Nations, of which the Esquimaux, or Eskimo, are the most important. (g) The American Aborigines, or Red Indians.

4. The Dravidians, or Aborigines of India.— These tribes have the skin generally very dark, frequently quite black; their hair is long and black, not straight but crimped or curly: the hair of beard and body grows profusely. the lips are thick and fleshy, somewhat like those of the negro, but the jaws are never prominent. The Dravidians comprise the Tamuls, Telugus, Gonds, Santals, or Sonthals.

5. The Hottentots and Bushmen.—These are tribes of little importance inhabiting South Africa. They have their hair tufted and matted, the beard scanty, the body almost hairless; the lips are full, but not so much so as with the negroes; the nose is of the snub shape: the opening of the eyes is narrow but not oblique. They are slimly built, and the Bushmen in particular low in stature; their color is yellowish or yellowish-brown.

6. The Negroes.-The negroes inhabit Africa from the southern margin of the Sahara to the territory of the Hottentots and Bushmen. and from the Atlantic to the Indian Ocean. They display great variety in external characteristics, and what is popularly considered the typical negro is rarely met with. The color of the skin passes through every gradation. from ebony-black to dark brown, copper-red. olive, or yellow. In some tribes the nose is straight, in others hooked, though often broad and flat. The hair of the head is generally short, elliptic in section, and much crimped: that on the body is not plentiful; whiskers are comparatively rare. The negroes may be divided into the Bantu negroes (including the Kaffirs, Bechuanas, etc.) and the Soudan negroes, these divisions being based on differences in language. It is in the Soudan region that the most typical members of the negro race are found.

7. The Mediterranean Nations.— These include all Europeans who are not Mongoloids, the North Africans, all Western Asiatics, and the Hindus. Among them are the highest members of the human race. The northern nations have the skin quite fair; the southern



have it darker; in North Africa and Eastern Asia it becomes yellow, red, or brown. The nose has always a high bridge; protruding and prominence of the jaws and cheek-bones are rare; the lips are never intumescent, and in no other race are refined and noble features so frequent. Subdivisions are: (a) The Hamites comprising the ancient Egyptians, the Copts of Egypt, and the Nubians, the Berbers and Gallas. (b) The Semites. These comprise the Jews, Arabs, and Abyssinians, and the ancient Canaanites, Assyrians, Babylonians, and Phœnicians. (c) The Indo-European, or Aryan family. This family is divided into branches, a Euro-The European compean and an Asiatic. prises the Germanic (or Teutonic) nations (English, Germans, Dutch, Danes, Norwegians, Swedes, etc.), the Romance nations (French, Italians, Spaniards, Portuguese), the Slavonians (Russians, Bohemians, Servians, etc.), the Greeks, and lastly the Celts. The Asiatic comprises the Hindus, Afghans, Persians, Armenians, and Kurds. (d) Europeans of doubtful positions. These include the Basques of the northeast of Spain and southwest of France and various tribes in the Caucasus.

Ettenne (à-ti-àn), ST., a town of Southern France, dep. Loire, on the Furens, 32 mi. s.w. of Lyons. The town stands in the center of one of the most valuable mineral fields of France; and in addition to the extensive collieries, blast-furnaces, and other iron works in the vicinity, has manufactures of ribbons, silks, cutlery, firearms, etc. The collieries alone employ about 16,000 men. Pop. 117.875.

Etive (et'iv), Loch, an inlet of the sea on the west coast of Scotland, in the county of Argyle. The scenery of its shores is very beautiful.

Etna (or Ætna), MOUNT, the greatest volcano in Europe, a mountain in the province of Catania in Sicily; height 10,874 ft. It rises immediately from the sea, has a circumference of more than 100 mi., and dominates the whole northeast part of Sicily, having a number of towns and villages on its lower slopes. The top is covered with perpetual snow; midway down is the woody or forest region; at the foot is a region of orchards, vineyards, olive groves, etc. Etna thus presents the variety of climates common to high mountains in lower latitudes, oranges and lemons and other fruits growing at the foot, the vine rather higher up, then oaks, chestnuts, beeches, and pines, while on the loftiest or desert region vegetation is of quite a stunted character. A more or less distinct margin of cliff separates the mountain proper from the surrounding plain; and the whole mass seems formed of a series of superimposed mountains, the terminal volcano being surrounded by a number of cones, all of volcanic origin, and nearly 100 of which are of considerable size. From the summit the view presents a splendid panorama, embracing the whole of Sicily, the Lipari Islands, Malta, and Calabria. The eruptions of Etna have been numerous, and many of them destructive. That of 1169 overwhelmed Catania and buried 15,000 persons in the ruins. In 1669 the lava spread over the country for forty days, and 10,000 persons are estimated to have perished. In 1693 there was an earthquake during the eruption, when over 60,000 lives were lost. Among more recent eruptions are those of 1832, 1865, 1874, 1879. An eruption is ordinarily preceded by premonitory symptoms of longer or shorter duration. The pop. of the district of Etna is about 300,000.

Etru'ria, (Greek, Tyrrhenia), the name anciently given to that part of Italy which corresponded partly with the modern Tuscany. and was bounded by the Mediterranean, the Apennines, the river Magra, and the Tiber. The name of Tusci or Etrusci was used by the Romans to designate the race of people anciently inhabiting this country, but the name by which they called themselves was Rasena (or perhaps more correctly Ta-rasena). Etruria proper was in a flourishing condition before the foundation of Rome, 753 B. c. It was known very early as a confederation of twelve great cities, each of which formed a republic of itself. After a long struggle with Rome the Etruscan power was completely broken by the Romans in a series of victories, from the fall of Veii in 396 B. c. to the battle at the Vadimonian Lake (283 B. c.). The Etruscans had attained a high state of civilization. They carried on a flourishing commerce, and at one time were powerful at sea. They were less warlike than most of the nations around them. and had the custom of hiring mercenaries for their armies.

Etruscan art was in the main borrowed from Greece. For articles in terra cotta. a material which they used mainly for ornamental tiles, sarcophagi, and statues, Etruscans were especially celebrated. In the manufacture of pottery they had made great advances; but most of the painted vases popularly known as Etruscan are undoubtedly productions of Greek workmen.

**Etruria**, kingdom of, in Italy, founded by Napoleon I in 1801. Its capital was Florence. In 1807 Napoleon incorporated it with the French Empire.

Etruscan Vases, a class of beautiful ancient painted vases made in Etruria, but not strictly speaking a product of Etruscan art, since they were really the productions of a ripe are of Greek art, the workmanship, subjects, style, and inscriptions being all Greek. They are elegant in form and enriched with bands of beautiful foliage and other ornaments, figures and similar subjects of a highly artistic character. One class has black figures and ornaments on a red ground - the natural color of the clay; another has the figures left of the natural color and the ground painted black. The former class belong to a date about G(t)B. c., the latter date about a century later, and extend over a period of about 300 or 350 years. when the manufacture seems to have ceased. During this period there was much variety in the form and ornamentation, gold and other colors beside the primitive ones of black and red being frequently made use of in their embellishment.

Etty, WILLIAM (1787-1849), an English painter. He studied at the Royal Academy. His principal works are: a series of three pictures (1827-31) illustrating the Deliverance of Bethulin by Judith, Benaiah one of David's Mighty Men, Woman Interceding for the Vanquished.

Etymol'ogy, a term applied, 1, to that part of grammar which treats of the various inflec-tions and modifications of words, and shows how they are formed from simple roots; 2, to that branch of philology which traces the history of words from their origin to their latest form and meaning. Etymology in this latter sense, or the investigation of the origin and growth of words, is among the oldest of studies. Plato and other Greek philosophers, the Alexandrian grammarians, the scholiasts, the Roman Varro, and others wrote much on this subject. It was not till recent times, and particularly since the study of Sanskrit, that etymology has been scientifically studied. Languages then began to be properly classed in groups and families, and words were studied by a comparison of their growth and relationship in different languages. It was recognized that the development of language is not an arbitrary or accidental matter, but proceeds ac-cording to general laws. The result was a great advance in etymological knowledge and the formation of a new science of philology (which see).

Eubce'a, formerly called Negropont, a Greek island, the second largest island of the Ægean It is 90 mi. in length; 30 in greatest Sea. breadth, reduced at one point to 4 mi. It is separated from the mainland of Greece by the narrow channels of Egripo and Talanta. It is connected with the Bootian shore by a bridge. There are several mountain peaks over 2,000 ft. and one over 7,000 ft. The island is well wooded and remarkably fertile. Wine is a staple product, and cotton, wool, pitch, and turpentine are exported. The chief towns are Chalcis and Karysto. With some small islands it forms a modern nomarchy, with a pop. of 95,136.

Eucalyp'tus, a genus of trees, mostly natives of Australia, and remarkable for their gigantic size, some of them attaining the height of 480 or 500 ft. In the Australian colonies they are known by the name of gumtrees, from the gum which exudes from their trunks; and some of them have also such names as "stringy bark," "iron bark," etc. The wood is excellent for shipbuilding and such purposes. The blue gum yields an essential oil which is valuable as a febrifuge, antiasthmatic, and antispasmodic; the medicinal properties of this tree also make it useful as a disinfectant, and as an astringent in affections of the respiratory passages, being employed in the form of an infusion, a decoction, or an extract, and cigarettes made of the leaves being also smoked. E. globulus and the E. amygdalina are found to have an excellent sanitary effect when planted in malarious districts such as the Roman Campagna, parts of which have already been reclaimed by their use. This result is partly brought about by the drainage of

the soil (the trees absorbing great quantities of moisture), partly perhaps by the balsamic



Eucalyptus.

odor given out. E. mannifera and others yield a sweet secretion resembling manna.

**Euclid** (Eucleides), of Alexandria, a distinguished Greek mathematician, who flourished about 300 B. c. His *Elements of Geometry* in thirteen books are still extant, and form the most usual introduction to the study of geometry. The severity and accuracy of his methods of demonstration have as a whole never been surpassed. Besides the *Elements*, some other works are attributed to Euclid.

Eudiom'eter, an instrument originally designed for ascertaining the purity of the air or the quantity of oxygen it contains, but now employed generally in the analysis of gaseous mixtures. It consists of a graduated glass tube, either straight or bent in the shape of the letter U, hermetically sealed at one end and open at the other. Two platinum wires, intended for the conveyance of electric sparks through any mixture of gases, are inserted through the glass near the closed end of the tube, and approach but do not touch each The electric spark causes chemical other. combination to take place between the oxygen in the gas to be analyzed, and hydrogen which has been introduced into the tube, and the nature and proportion of the constituents of gaseous mixture are determined by the diminution in volume after the passing of the spark. Certain substances, such as caustic, potash, pyrogallic acid, etc., may be introduced into the closed tube in order to absorb the gases present one by one.

Eufala, Barbour co., Ala., on Chattahoochee River, 80 mi. s.e. of Montgomery. Railroads: Montgomery & Eufala; Eufala & Ozark; and South Western. Industries: two cotton mills, carriage factory, planing mills, and canning factory. Surrounding country agricultural. Pop. est. 1897, 8,000.

**Eugene**  $(\bar{u}$ -jēn') (or François Eugène) (1663-1736), Prince of Savoy, fifth son of Eugène

## Eugénie

Maurice, duke of Savoy-Carignan, and Olympia Mencini, a niece of Cardinal Mazarin, was born at Paris. Offended with Louis XIV he entered the Austrian service in 1683, serving his first campaign as a volunteer against the Turks. At the end of the war he was sent as commander-in-chief to Hungary. The Spanish War of Succession brought Eugene again into the field. In 1703 he commanded the imperial army in Germany, and in co-operation with Marlborough frustrated the plans of France and her allies. In the battle of Höchstadt, or Blenheim, Eugene and Marlborough defeated the French and Bavarians under Marshal Tallard, Aug. 13, 1704. Next year Eugene, returning to Italy, forced the French to raise the siege of Turin, and in one month drove them out of Italy. During the following years he fought on the Rhine, took Lille, and, in conjunction with Marlborough defeated the French at Oudenarde (1708), and Malplaquet (1709), where he himself was dan-gerously wounded. After the recall of Marl-borough, which Eugene opposed in person at London without success, and the defection of England from the alliance against France, his farther progress was in a great measure checked. In the war with Turkey, in 1716, Eugene defeated two superior armies at Peterwaraden and Temesvar, and, in 1717, took Belgrade, after having gained a decisive victory over a third army that came to its relief. During fifteen years of peace which followed, Eugene served Austria as faithfully in the cabinet as he had done in the field. He died in Vienna. He was one of the great generals of modern times.

Eugénie (eu-zhā-nē), MARIE DE GUZMAN, exempress of the French, b. at Granada, in Spain, in 1826. Her father, the Count de Montijo, was of a noble Spanish family; her mother was of Scotch extraction, maiden name Kirkpat-rick. On Jan. 29, 1853, she became the wife of Napoleon III and empress of the French. On March 16, 1856, a son was born of the marriage. When the war broke out with Germany she was appointed regent (July 27, 1870) during the absence of the emperor, but on September 4 the revolution forced her to flee from France. She went to England, where she was joined by the prince imperial and afterward by the emperor. Camden House, Chiselhurst, became the residence of the imperial exiles. On Jan. 9, 1873, the emperor died, and six years later the prince imperial was slain while serving with the English army in Africa, in the Zulu War. In 1881 the empress transferred her residence to Farnborough, in Hampshire.

**Eulenspiegel** (oi'len-spē-gl), TILL, a name which has become associated in Germany with all sorts of wild, whimsical frolics, and with many amusing stories. Some such popular hero of tradition and folk-lore seems to have really existed in Germany, probably in the first half of the fourteenth century, and a collection of popular tales of a frolicsome character, originally written in Low German, purports to contain his adventures.

## Euphrates

Eupato'rium, a genus of plants chiefly natives of America, belonging to the natural order Compositæ. Their roots are perennial, possessing a rough, bitter or aromatic taste: the flowers are small, white, reddish, or bluish, in corymbs.

Eupho'nium, a brass bass instrument, generally introduced into military bands, and frequently met with in the orchestra as a substitute for the bass trombone, from which, however, it is very different in tone. It is tuned on C or on N



Hemp Agrimony.

is tuned on C or on B flat, and is furnished with three or four valves or pistons.

Euphorbia'ceæ, the spurgeworts, a natural order of herbaceous plants, shrubs, or ver



Caper Spurge.

large trees, which occur in all regions of the globe. Most of them have an acrid, milky juice, and diclinous or monectious flowers. The fruit is dry or slightly fleshy, and threelobed.

**Euphra'tes** (or El Frat), a celebrated river of Western Asia, in Asiatic Turkey, having a double source in two streams rising in the Anti-Taurus Range. Its total length is about 1.750mi., and the area of its basin 260,000 sq. mi. It flows mainly in a southeasterly course through the great alluvial plains of Babylonia and Chaldæa till it falls into the Persian Gulf by several mouths, of which only one in Persian territory is navigable. About 100 mi. from its mouth it is joined by the Tigris, when the

## Euphulsm

united streams take the name of Shatt-el-Arab. It is navigable for about 1,200 mi., but navigation is somewhat impeded by rapids and shallows. The melting of snow in the Taurus and Anti-Taurus causes a flooding in spring. The water is highest in May and June, when the current, which rarely exceeds 3 mi. an hour, rises to 5 mi. an hour.

Eu'phuism, an affected style of speech which distinguished the conversation and writings of many of the wits of the court of Queen Elizabeth. The name and the style were derived from the Euphues, the Anatomy of Wit (about 1580), and the Euphues and his England (about 1582), of John Lyly.

**Eura**' sians (syncopated from Europ-Asians), a name sometimes given to the "half-castes" of India. the offspring of European fathers and Indian mothers. They are particularly common in the three presidential capitals— Calcutta, Madras, and Bombay. They generally receive a European education, and the young men are often engaged in government or mercantile offices. The girls in spite of their dark tint are generally very pretty, and often marry Europeans.

Eure (cur), a river of n.w. France, which rises in the department of the Orne, and falls into the Seine after a course of 124 mi., being navigable for about half the distance. It gives its name to a department in the n.w. of France, forming part of Normandy; area 2,300 sq. mi. Apples, pears, plums, and cherries form important crops, and a little wine is produced. The mining and manufacturing industries are extensive, and the department has a considerable trade in woolen cloth, linen and cotton fabrics, carpets, leather, paper, glass. Evreux is the capital. Pop. 358,829.

**Eure-et-Loir** (eur-è-lwär), a department in the n.w. of France, forming part of the old provinces of Orléannais and Ile-de-France; area 2.267 sq. mi. A considerable portion is occupied by orchards and vineyards, but the greater part is devoted to cereal crops. The department is essentially agricultural, and has few manufactures. The capital is Chartres. Pop. 283,719.

**Eure** 'ka("I have found it"), the exclamation of Archimedes, when, after long study, he discovered a method of detecting the amount of alloy in King Hiero's crown. Hence the word is used as an expression of triumph at a discovery or supposed discovery.

**Eureka**, Humboldt co., Cal., on Humboldt Bay, 225 mi. n. of San Francisco. Railroads: E. R. & E.; K. & E.; E. & M. R. Industries: lumber and shingle mills, two iron foundries, tannery, sash and door, and farm implement factories. Surrounding country agricultural and grazing. The town was first settled in 1850, and became a city in 1870. Pop. est. 1890, about 8,000.

Eurip' ides (- $d\bar{e}z$ ) (B. c. 485-406), a celebrated Athenian tragedian. He studied under Prodicus and Anaxagoras, and is said to have begun to write tragedies at the age of eighteen, although his first published play, the *Peliades*, **appeared** only in 455 B. c. He was not successful in gaining the first prize till the year 441 B. C., and he continued to exhibit till 408 B. C., when he exhibited the Orestes. According to a tradition he was killed by hounds. Euripides is a master of tragic situations and pathos, and shows much knowledge of human nature and skill in grouping characters, but his works lack the artistic completeness and the sublime earnestness that characterize Æschylus and Sophocles. Euripides is said to have composed seventy-five, or, according to another authority, ninety-two tragedies. Of these eighteen (or nineteen, including the Rhesus) are extant: viz., Alcestis, Medea, Hippolytus, Heruba, Herachida, Supplices, Ion, Hereules Furens, Andromache, Troades, Electro, Helena, Iphigenia in Tauris, Orestes, Pharmane, Bacches, Iphigenia in Aulis, and Cyclops,

**Euro' pa**, in Greek mythology, the daughter of Agënor, king of the Phœnicians, and the sister of Cadmus. The fable relates that sine was abducted by Jupiter, who for that occasion had assumed the form of a bull, and swam with his prize to the island of Crete.

**Europe**, the smallest of the great continents, but the most important in the history of civilization for the last two thousand years. It forms a huge peninsula projecting from Asia, and is bounded on the north by the Arctic Ocean; on the west by the Atlantic Ocean; on the south by the Mediterranean, the Black Sea, and the Caucasus Range; on the east by the Caspian Sea, the Ural River, and the Ural Mountains. The most northerly point on the mainland is Cape Nordkyn, in Lapland, in lat. 71° 6'; the most southerly points are Punta da Tarifa, lat.  $36^{\circ}$  n., in the Strait of Gibraltar. and Cape Matapan, lat. 360 17', which terminates Greece. The most westerly point is Cape Roca, in Portugal, in lon. 9° 28' w., while Ekaterinburg is in lon. 60° 35' e. From Cape Matapan to North Cape is a direct distance of 2,400 mi., from Cape St. Vincent to Ekaterinburg n. e. by e., 3,400 mi.; area of the conti-nent about 3,800,000 sq. mi. Great Britain and Ireland, Iceland, Nova Zembla, Corsica, Sardinia, Sicily, Malta, Crete, the Ionian and the Balearic Islands are the chief islands of Europe. The shores are very much indented, giving Europe an immense length of coastline (estimated at nearly 50,000 mi.). The chief seas or arms of the sea are: the White Sea on the north; the North Sea, or German Ocean, on the west, from which branches off the great gulf or inland sea known as the Baltic; the English Channel, between England and France; the Mediterranean, communicating with the Atlantic by the Strait of Gibraltar (at one point only 19 mi. wide); the Adriatic and Archipelago, branching off from the Mediterranean; and the Black Sea, connected with the Archipelago through the Hellespont, Sea

of Marmora, and Bosphorus. Surface.—The mountains form several distinct groups or systems of very different geological dates, the loftiest mountain masses being in the south central region. The Scandinavian mountains in the northwest, to which the great northern peninsula owes its form. extend above 900 mi. from the Polar Sea to the south point of Norway. The highest sum-mits are about 8,000 ft. The Alps, the highest mountains in Europe (unless Mount Elbruz in the Caucasus is claimed as European), extend from the Mediterranean first in a northerly and then in an easterly direction, and attain their greatest elevation in Mont Blanc (15,781 ft.), Monte Rosa, and other summits. Branching off from the Alps, though not geologically connected with them, are the Apennines, which run southeast through Italy, constituting the central ridge of the peninsula. The highest summit is Monte Corno (9,541 ft.). Mount Vesuvius, the celebrated volcano in the south of the peninsula, is quite distinct from the Apennines. By southeastern extensions the Alps are connected with the Balkan and the Despoto-Dagh of the southeastern peninsula of Europe. Among the mountains of Southwestern Europe are several massive chains, the loftiest summits being in the Pyrenees, and in the Sierra Nevada in the south of the Iberian Peninsula. The highest point in the former. La Maladetta, or Mont Maudit, has an elevation of 11,165 ft.; Mulahacen, in the latter, is 11,703 ft., and capped by per-petual snow. West and northwest of the Alps are the Cevennes, Jura, and Vosges; north and northeast, the Harz, the Thuringerwald Mountains, the Fichtelgebirge, the Erzgebirge, and Böhmerwaldgebirge. Further to the east the Carpathian chain encloses the great plain of Hungary, attaining an elevation of 8,000 or 8,500 ft. The Ural Mountains between Europe and Asia reach the height of 5,540 ft. Besides Vesuvius, two other volcanoes are Etna in Sicily, and Hecla in Iceland. A great part of northern and eastern Europe is level. The great plain of North Europe occupies part of France, Western and Northern Belgium, Hol-land, the northern provinces of Germany, and the greater part of Russia. A large portion of this plain, extending through Holland and North Germany, is a low sandy level protected from inroads of the sea only by means of strong dikes. The other great plains of Europe are the plain of Lombardy (the most fertile district in Europe) and the plain of Hungary. Part of Southern and Southeastern Russia consists of steppes.

Rivers and Lakes.—The main European watershed runs in a winding direction from southwest to northeast, at its northeastern extremity, being of very slight elevation. From the Alps descend some of the largest of the European rivers, the Rhine, the Rhone, and the Po, while the Danube, a still greater stream, rises in the Black Forest north of the Alps. The Volga, which enters the Caspian Sea, an inland sheet without outlet, is the longest of European rivers, having a direct length of nearly 1.700 mi. including windings 2.400 miles. Into the Mediterranean, flow the Ebro, the Rhone, and the Po; into the Black Sea, the Danube, Dnieper, Dniester, and Don (through the Sea of Azov); into the Atlantic, the Guadalquivir, the Guadiana, the Tagus, and Loire; into the English Channel, the Seine; into the North Sea, the Rhine, Elbe: into the Baltic, the Oder, the Vistula, and the Duna; into the Arctic Ocean the Ibwina. The lakes of Europe may be divided into two groups, the southern and the northern. The former run along both sides of the Alps, and among them, on the north side, are the lakes of Geneva, Neuchátel, Thun, Lucerne, Zürich, and Constance; on the south side, Lago Maggiore, and the lakes of Como, Lugano, Iseo, and Garda. The northern lakes extend across Sweden from west to east, and on the east side of the Baltic a number of lakes, stretching in the same direction across Finland on the borders of Russia, mark the continuation of the line of depression. It is in Russia that the largest European lakes are found—Lakes Ladoga and Onega.

Geology.—The geological features of Europe are exceedingly varied. The older formations prevail in the northern part as compared with the southern half and the middle region. North of the latitude of Edinburgh and Moscow there is very little of the surface of more recent origin than the strata of the Upper Jura belonging to the Mesozoic period, and there are vast tracts occupied either by eruptive rocks or one or other of the older sedimentary formations. Denmark and the portions of Germany adjoining belong to the Cretaceous period, as does also a large part of Russia between the Volga and the basin of the Dnieper. Middle and Eastern Germany, with Poland and the valley of the Dnieper present on the surface Eocene formations of the Tertiary period. The remainder of Europe is remarkable for the great diversity of its superficial structure. rocks and deposits belonging to all periods being found within it, and having for the most part no great superficial extent. Europe possesses abundant stores of those minerals which are of most importance to man, such as coal and iron, Britain being particularly favored in this respect. Coal and iron are also ob-tained in France, Belgium, and Germany. Gold is found to an unimportant extent, and silver is widely spread in small quantities. The richest silver ores are in Norway. Spain, the Erzgebirge, and the Harz Mountains. Spain is also rich in quicksilver. Copper ores are abundant in the Ural Mountains, Thuringia. Cornwall, and Spain. Tin ores are found in Cornwall, the Erzgebirge, and Brittany.

Climate.—Several circumstances concur to give Europe a climate peculiarly genial, such as its position almost wholly within the temperate zone, and the great extent of its maritime boundaries. Much benefit is also derived from the fact that its shores are exposed to the warm marine currents and warm winds from the southwest, which prevent the formation of ice on most of its northern shores. The eastern portion has a less favorable ciimate than the western. The extremes of temperature are greater, the summer being hotter and the winter colder, while the lines of equal mean temperature decline south as we go east. The same advantages of mild and genial temperature which Western has over Eastern





Europe, the continent collectively has over the rest of the Old World. The diminution of mean temperature, as well as the intensity of the opposite seasons, increases as we go east. Peking, in lat  $40^{\circ}$  n., has as severe a winter as St. Petersburg in lat.  $60^{\circ}$ .

Vegetable Productions .- With respect to the vegetable kingdom Europe may be divided into four zones. The first, or most northern, is that of fir and birch. The birch reaches almost to North Cape; the fir ceases a degree farther south. The cultivation of grain extends farther north than might be supposed. Barely ripens even under the 70th parallel of north latitude; wheat ceases at  $64^{\circ}$  in Norway,  $62^{\circ}$  in Sweden. Within this zone, the southern limit of which extends from lat. 64° in Norway to lat. 62° in Russia, agriculture has little importance, its inhabitants being chiefly occupied with the care of reindeer or cattle, and in fishing. The next zone, which may be called that of the oak and beech, and cereal produce, extends from the limit above mentioned to the 48th parallel. The Alps, though beyond the limit, by reason of their elevation belon; to this zone, in the moister parts of which cattle husbandry has been brought to perfection. Next we find the zone of the chestnut and vine, occupying the space between the 48th parallel and the mountain chains of Southern Europe. Here the oak still flourishes, but the pine species become rarer. Rye, which characterizes the preceding zone on the continent, gives way to wheat, and in the southern portion of it to maize also. The fourth zone, comprehending the southern peninsulas, is that of the olive and evergreen woods. The orange flourishes in the southern portion of it, and rice is cultivated in a few spots in Italy and Spain.

Animals.—As regards animals the reindeer and polar bears are peculiar to the north. Bears and wolves still inhabit the forests and mountains; but, in general, cultivation and population have expelled wild animals. The domesticated animals are nearly the same throughout. The ass and mule lose their size and beauty north of the Pyrenees and Alps. The Mediterranean Sea has many species of fish, but no great fishery; the northern seas, on the other hand, are annually filled with countless shoals of a few species, chiefly the herring, mackerel, cod, and salmon.

Inhabitants.-Europe is occupied by several different peoples or races, in many parts now greatly intermingled. The Celts once possessed the west of Europe from the Alps to the British Islands. But the Celtic nationalities were broken by the wave of Roman conquest, and the succeeding invasions of the Germanic tribes completed their political ruin. At the present day the Celtic language is spoken only in the Scotch Highlands (Gaelic), in some parts of Ireland (Irish), in Wales (Cymric), and in Brittany (Armorican). Next to the Celtic comes the Teutonic race, comprehending the Germanic and Scandinavian branches. **The** former includes the Germans, the Dutch, and the English. The Scandinavians are divided

into Danes, Swedes, and Norwegians. To the east, in general, of the Teutonic race, though sometimes mixed with it, come the Slavonians, that is, the Russians, the Poles, the Czechs, or Bohemians, the Servians, Croatians, etc. In the south and southeast of Europe are the Greek and Latin peoples, the latter comprising the Italians, French, Spanish, and Portuguese. All the above peoples are regarded as belonging to the Indo-European or Aryan stock. To the Mongolian stock belong the Turks, Finns, Lapps, and Magyars, or Hungarians, all immigrants into Europe in comparatively recent The Basques, at the western extremity times. of the Pyrenees, are a people whose affinities have not been determined. The total population of Europe is about 330,000,000; nine tenths speak the languages of the Indo-European family, the Teutonic group numbering about 108,000,000, the Slavonic and Latin over 95,-000,000 each. The prevailing religion is the Christian, embracing the Roman Catholic Church, which is the most numerous, the various sects of Protestants (Lutheran, Calvinistic, Anglican, Baptists, Methodists, etc.), and the Greek Church. A part of the inhabitants profess the Jewish, a part the Mohammedan religion.

Political Divisions.—The states of Europe are as follows: Austria-Hungary, Liechtenstein, Bosnia, Herzegovina, etc.; Belgium; Denmark, Faroe, and Iceland; France: Germany; Britain; Greece; Netherlands, Luxemburg; Italy; Montenegro; Portugal; Roumania; Russia; Servia; Spain; Sweden; Norway; Switzerland: Turkey, Bulgaria, Eastern Roumelia.

*History.*—Europe was probably first peopled from Asia, but at what date we know not. The first authentic history begins in Greece at about 776 B.C. Greek civilization was at its most flourishing period about 430 B.C. After Greece came Rome, which, by the early part of the Christian era, had conquered Spain, Greece, Gaul, Helvetia, Germany between the Danube and the Alps, Illyria, Dacia, etc. Improved laws and superior arts of life spread with the Roman empire throughout Europe. and the unity of government was also extremely favorable to the extension of Christianity. With the decline of the Roman Empire a great change in the political constitution of Europe was produced by the universal migration of the northern nations. The Ostrogoths and Lombards settled in Italy, the Franks in France, the Visigoths in Spain, and the Anglo-Saxons in South Britain, reducing the inhabitants to subjection, or becoming incorporated with them. Under Charlemagne (771-814) a great Germanic empire was established, so extensive that the kingdoms of France, Germany, Italy, Burgundy, Lorraine. and Navarre were afterward formed out of it. About this time the northern and eastern nations of Europe began to exert an influence in the affairs of Europe. The Slavs, or Slavonians, founded kingdoms in Bohemia, Poland, Russia, and the north of Germany; the Magyars appeared in Hungary, and the Normans agitated all Europe, founding kingdoms and





principalities in England, France, Sicily, and the East. The Crusades and the growth of the Ottoman power are among the principal events which influenced Europe from the twelfth to the fifteenth century. The conquest of Con-stantinople by the Turks (1453) by driving the learned Greeks from this city, gave a new impulse to letters in Western Europe, which was carried onward by the invention of printing, and the Reformation. The discovery of America was followed by the temporary preponderance of Spain in Europe, and next of France. Subsequently Prussia and Russia gradually in-creased in territory and strength. The French Revolution (1789) and the Napoleonic wars had a profound effect on Europe, the dissolution of the old German Empire being one of the results. Since then the most important events in European history have been the establishment of the independence of Greece; the disappearance of Poland as a separate state; the unification of Italy under Victor Emmanuel; the Franco-German War, resulting in the consolidation of Germany into an empire under the leadership of Prussia; the partial dismemberment of the Turkish Empire, and the war between Turkey and Greece (1897).

**Eurydice** (ū-rid'i-sē), in Greek mythology, the wife of Orpheus.

**Eustis**, JAMES BIDDLE, soldier and statesman, b. 1834 in New Orleans, La. He graduated at Harvard Law School in 1854 and practised law until the war broke out. He served on the staff of Gen. J. E. Johnson till the close of the war. He was elected a member of the state legislature in 1872 and served in the U.S. Senate 1877-1879. He was again elected senator in 1884. President Cleveland appointed him minister to France.

**Euter'pe**, 1, one of the Muses, considered as presiding over lyric poetry, the invention of the flute being ascribed to her. She is usually represented as a virgin crowned with flowers, having a flute in her hand. 2. In botany, a genus of palms, natives of South America, sometimes nearly 100 ft. in height.

Ev'ans, OLIVER (1755-1819), b. in Newport, Del., was the inventor of the automatic flour mill and the high-pressure steam engine. He is also said to have invented the first steam road carriage ever worked in America.

**Evanston**, a suburb of Chicago, Cook co., Ill., situated 12 mi. n. of Chicago, on Lake Michigan. Railroads: Chicago & Northwestern, and Chicago, Milwaukee & St. Paul. It has good streets and many fine residences, also numerous churches, a city hall, and waterworks. The Northwestern University, the Garrett Biblical Institute, a college for young women, and other educational institutions are located here. Evanston is connected with Chicago by an electric street railroad. Pop. est. 1897, 14,000.

**Evansville**, Vanderburg co., Ind., on Ohio River, 163 mi. n.e. of St. Louis. Railroads: E. & T. H.; E. & L.; E. & R.; P. D. & E.; L. E. & St. L.; L. & N.; O. V.; L. H. & St. L.; E. S. &. N.; E. belt line. Industries: cotton mill. seven flouring mills, thirteen iron foundries, twenty-four furniture factories, three breweries, three sawmills, and a number of other industries. The town was first settled in 1812 by Hugh McGary and became a city in 1847, named after General Evans. Pop. est. 1897, 67,000.

**Evaporation**, the conversion of a liquid or solid by heat into vapor or steam, which becomes dissipated in the atmosphere in the manner of an elastic fluid. The process of evaporation is constantly going on at the surface of the earth, but principally at the surface of the sea, of lakes, rivers, and pools. The vapor thus formed, being specifically lighter than atmospheric air, rises to considerable heights above the earth's surface; and afterward, by a partial condensation, forms clouds, and finally descends in rain.

Evarts, W.M. M., wasb. in Boston, Feb. 6, 1818; graduated at Yale (1837), studied law at Harvard and was admitted to the bar in New York city in 1841. He was assistant district attorney in New York City from 1849 to 1853. In 1808 was counsel for President Johnson in the impeachment trial. In 1872 was counsel for the U. S. in the Alabama claims. His fees have amounted to \$50,000 for a single opinion. He served as secretary of state under President Hayes; visited Paris, in 1881, as a delegate to the international monetary conference and was elected U. S. senator in March, 1885.

**Evening-star** (or Hesperus), the name given to the planet Venus when visible in the evening. See *Venus*.

Ev'erett, ALEXANDER HILL (1792-1847), an American diplomatist. After studying at Harvard, in 1809 he accompanied John Quincy Adams to St. Petersburg as secretary of legation. He afterward filled successive diplomatic posts in the Netherlands. Spain, and elsewhere. He is the author, among other works, of Europe, or a General Survey of the Present Situation of the Principal Powers (1822): and a similar work on America.

Everett, EDWARD (1794-1865), an American statesman and author, brother of the preceding. After traveling for some years in Germany and England he returned to America in 1819 to occupy the chair of Greek literature at Harvard. He became editor of the North American Review, and entering the political world became successively member of Congress, governor of Massachusetts, and minister plenipotentiary in England (1840). In 1845 he was appointed president of Harvard College, and in 1852 secretary of state. Shortly after he retired into private life.

Everett, Middlesex co., Mass., on Charles and Malden rivers. Railroad, Boston & Maine. Industries: chemical works, iron foundry, furniture, shoe, bicycle, glove, pickle, lead, and varnish factories. Oil in vicinity. The town was first settled in 1634 as a part of Malden. incorporated as a town in 1870 and became a city in 1893. Pop. est. 1897, 22,000. Everglades, a low marshy tract of country

**Everglades,** a low marshy tract of country in Southern Florida, inundated with water and interspersed with patches or portions covered with high grass and trees. They are 160 mi. long and 60 broad.

#### Evergreen

**Evergreen**, a plant that retains its verdure through all the seasons, as the fir, the holly, the laurel, the cedar, the cypress, the juniper,

the holm-oak, and many Evergreens shed others. their old leaves in the spring or summer, after the new foliage has been formed, and consequently are verdant through all the winter season. They form a considerable part of the shrubs commonly cultivated in gardens, and are beautiful at all seasons of the year.

Everlasting-flowers, a name applied to certain plants which, when dried, suffer little change in their appearance. The plants to which this name is peculiarly applied belong to the genus Helichrysum, but it is also given to members

of allied genera, such as Everlasting-flower. Antennaria, Gnaphalium, etc.

Evolution.-Upon every developing mind, whether infantile or consciously philosophic, there presses at times the question of the origin of things. The attempt to answer this is to construct a cosmogony; and is alike the earliest and latest extension of our common-sense account of things into complete and more orderly form as science. This philosophy of things is not only incapable of being grasped by the highest effort of the intellect, but is incessantly contradicted by experience; it has hence never gained any real acceptance from the simplest common sense, much less any confirmation from science. The alternative then arises of drawing an explanation of the origin of things from our experience not of permanence, but of change. Here it is naturally the most changeful phenomena, the most marked and sudden contrasts, which first and most deeply arouse our attention, and this not only in nature, but still more in human life and affairs. The hypothesis of a sudden and unexplained, of a mysterious appearance or creation of things, thus next presents itself; and the subsequent explanation of this as an act of external will is rendered easy by our personal consciousness. Phenomena are becoming classified and interconnected in larger and larger groups, with which a higher anthropomorphism can henceforth associate a conception of detailed design. The older view only remains provisionally so far as order is not yet apparent. Human affairs become more and more obviously interpretable than of old, and there arises in their place the characteristically modern ideas of progress. Natural science has become meanwhile more active, the very astronomical and geological phenomena from which our ideas of permanence were most derived are seen to be in process of change. The idea of the present as the product of the past also becomes extended to the



# Evolution

world of organic life. The details, the general mechanism and direction of the processes of change, thus become inquiries of paramount interest. It is admitted on all hands that the evolution theory only supersedes those cruder anthropomorphisms of arbitrary creation and of mechanical contrivance which presented the universe as a mere aggregate of finished products, without excluding that higher and more unified teleology which interprets it as the orderly unfolding of a cosmic drama.

Evolution in the Physical Sciences-Astronomy. Here, as in other sciences, early conceptions of the universe agree in viewing it as being, as far as possible, in permanence and at rest, and not in change and motion. Such static views may be only tacitly implied, but are more usually directly avowed: thus the earth was long viewed as a plane stably supported, and until very recently the stars were viewed as fixed. But as the static universe of the an-cient astronomer passed into that of Copernicus and Kepler, Galileo and Newton, Herschel and Leverrier, dynamic, or more accurately kinetic, conceptions have henceforward an assured prominence in at least one science, and that the one most obviously concerned with the universe as a whole. For although evolutionary speculations of more or less vagueness seem to have arisen once and again in almost every science, the first well-developed theory of evolution which has attempted to cope with the observed facts of any science must be credited to astronomy in the famous Nebular Hypothesis, of which the suggestiveness to all other departments of science must be freely admitted. For the mind which has once fully grasped the conception of stellar and planetary evolution cannot readily stop there.

Evolution in Geology .- That the last century mineralogist was here and there already widening his interest to the rocks and even meditating as to their nature and origin is well evidenced by the penetrating speculation of Linnæus: "It may be that the solid rocks are not primeval, but the daughters of time." As subsequent generations of research have shown us, this solid rock is the product of igneous and that of aqueous action, here reaching back to an incalculable antiquity, or there evolved within the period of human occupancy; while others consist in great part, or even completely, of the remains of extinct animals or plants. These are conceptions now so familiar that it is difficult to realize their once revolutionary appearance and effect. More detailed studies, too, would be of no little service to our general theories; note, for instance, how the geologist takes from the astronomer, now a stellar evolutionist, the cooling planet, and outlines its primeval surroundings of land and sea, its wrinkling hills and vales, how he proves that the pulse of the ocean is but the dying ripple of a once fiftyfold mightier tidal wave, or how the glacial period is the inexorably recurrent winter of a year of ages. The mineralogist no longer merely measures and analyzes, but deciphers the origin and transmutation of min-

eral species, and of the rocks they form under the forces of the environment; and the typically changeful phenomena of climate and atmosphere are rendered the subject of a typically dynamic sub-science.

Modal Explanation of Physical Evolution.-We must sooner or later inquire whether any general principle can be found to verify and rationalize the process of evolution in the physical world, and to this the answer has been specially elaborated by Herbert Spencer. His essential principle, or *Law of Evolution*, must be stated in his own words: "Evolution is an integration of matter and concomitant dissipation of motion during which the matter passes from an indefinite, incoherent heterogeneity to a definite, coherent homogeneity, and during which the retained motion under-goes a parallel transformation." And although the student who seeks to follow Mr. Spencer in grappling with the riddle of evolution in higher orders of phenomena may not admit that his uncompromising applications of the principles of physical evolution to higher categories is so exhaustive and satisfactory as he claims, there can be no doubt that his general treatment has been on the whole amply justified, so far as it goes, alike in unifying the sciences, and in the separate organization of these.

Evolution in Biology. - This portion of the subject demands special attention and fullest outline for many reasons. Not only is the transition from static to evolutionary conceptions of comparatively recent, indeed almost contemporary interest; but the progress of the doctrine of evolution as a general theory of the universe has been most closely connected with progress in biology. And while we can at best merely speculate as to the direct continuity of evolution from the inorganic to the organic world, we are constantly impressed by the fundamental unity of the process in the simplest and most complex forms of life, and by the thoroughness with which the same principles may be traced into the highest "superorganic" phenomena of mind and society. The general argument for evolution appended by Darwin to the classic statement of his theory of Natural Selection in the Origin of Species has been already summarized under Daricinian Theory. Only the briefest reference to these need here be made. We must keep, for instance, in view the conceptions of the actual evolution of the individual which have become systematized in the sub-science of embryology (see Embryology). Suffice it, however, here to recall that, although it is in this connection that the term evolution first makes its appearance, it is used along with development, in a sense diametrically opposed to its present significance, as the mere enlargement and unfolding of a form and structure in all essential respects a perfect miniature of that of the adult.

Without recording or analyzing the various conceptions of species, it is sufficient again to note how the belief in their objective constancy and practical definableness is shaken by

such facts as 1, that pre-evolutionary systematists differ hopelessly upon the number and limits of the species of all the more variable groups of plants and animals; 2, that the mere numerical increase of the number of specimens in our museums is constantly compelling us to recognize that great numbers, sometimes even scores or hundreds, of "type specimens" of irreproachably described "species" are but so many individual members of a series linked by the most infinitesimal gradations, yet of which the extremes differ by characters of specific, it may be even generic rank. And when, 3, the assumption of the general sterility of hybrids is proved experimentally to be an exaggeration, it becomes, to say the least, increasingly difficult seriously to support the dogma of the constancy of species.

Leaving the general external form with which the species maker is mainly concerned, we must accompany the anatomist through each level of his deepening analyses and comparisons, through organ systems and organs, tissues and cells, to the ultimate protoplasm itself. To realize how fully this analysis re-sults in the demonstration of an unsuspected unity of structure not only between species and genera, but far larger groups, some actual study of the concrete facts is indispensable; as also to appreciate the same beautiful unity of type in individual structures so differentiated as the appendages of a lobster, or the parts of a flower. Yet here again we have an instance of the tenacity of static conceptions; for although it could not be actually denied that the hypothesis of descent from common ancestors at least might explain the structural unity observable under classification, as from a simpler ancestor, that observable under the individual structure, the conception of conformity to a purely ideal "archetype," was long maintained. Rudimentary organs, such as the teeth of fostal whales, were thus explained not as reduced survivals of structures ancestrally useful, but as purely intellectual necessities of this arbitrary "conformity to type." This ingenious revival of Platonic ideas in conjunction with scholastic nominalism could not, however, very long survive the demonstration of the frequent absence of rudiments necessary for archetypal purposes; and the alternative evolutionary explanation has thus inevitably succeeded to its place.

It is much to learn from the taxonomist that his classification of species and genera, even the whole world of plants or animals, assumes the form of a vast genealogical tree; and it is no small confirmation of the evolutionary view to note how every new fossil trove throws some fresh light upon the order in which the branches or branchlets of this tree have historically developed. With all the missing links we can imagine or desire between the modern horse and his simple five-toed ancestor, not to speak of other examples, we have indeed evidence which may well satisfy us of the historic fact of evolution; but this brings us no nearer comprehending the rationale of the process. Leaving the morphological sciences, we must

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pass with Darwin to the study of what we may call the higher physiology. Assuming what is known of the functions of the individual, we must note not only the relations of the species unit (in higher forms usually of course the pair), and so familiarize ourselves with the phenomena of reproduction of sex, of heredity and variation, breeding and relation to offspring, the results of intercrossing, the modification by environment, etc., we must also consider the wider relations among the members of the same species, between allied species, and finally between practically unrelated ones, whether here of struggle or there of adaptation. He thus introduces us to this vast and practically new field, and gives us a glimpse of the living, whole nature in that magistral series of volumes, which we may as it were group into a Vita Natura, complementary to the static Systema Natura, and no less epoch-making for our day than was that of Linnæus for his.

It is necessary to refer more precisely to the history of opinion both as regards the fact of evolution and the factors in the process. The history of the two questions-of the empirical fact, and of the actual mechanism of evolution-can hardly be separated, though it is of course well known that the former was virtually settled by the demonstrations of Spencer, Darwin, Wallace, Haeckel, and others soon after the middle of this century, while we are still in the midst of keen debate as to the relative importance of the diverse factors. The history of the theory of evolution, so far as the organic world is concerned, is essentially modern; for in spite of vague hints and a priori speculations from Empedoeles onward, it was not till the eighteenth century that evolution began to be very definitely suggested as a modal explanation of the origin of our fauna and flora, or that inquiry began to be seriously directed to what we now call the etiology of organisms.

What was for so long only a germ idea at length took shape in the mind of Buffon (1749), who sought to show how new conditions evoked new functions, how these in turn reacted upon the structure of the organism, and how, most directly of all, altered climate, food, and other elements of the environment might be the external conditions of internal change, whether for progress or the reverse. Erasmus Darwin (1794), with a truly living conception of nature, emphasized the organism's inherent power of self-improvement, the molding influence of new needs, desires, and exertions, and the indirect action of the environment in evoking To Treviranus (1802-31) organisms apthese. peared almost indefinitely plastic, especially, however, under the direct influence of external forces, nor did his analysis of possible factors fail to recognize what Brooks, Weismann, and others have recently elaborated, that the union of diverse sexual elements in fertilization was in itself a foundation of change. Among the philosophers, especially in the minds of those who had been disciplined in physical or historical investigations, the speculations of the ancients were ever taking fresh form, gaining moreover in concreteness; witness the contributions of Kant and Herder. In Goethe's epic of evolution the adaptive influence of the environment is clearly recognized, while the misty theories of his contemporary, Oken, chiefly interpret the organic progress in terms of action and reaction between the organism and its surroundings. In France, Geoffroy and Isidore St. Hilaire, father and son, supported the thesis of definite variation under direct environmental influence. And before reaching even the contemporaries of Darwin a complete history would have to take account of the conclusions of many naturalists, such as Von Buch, Von Baer, Schleiden, Naudin, and Wagner. The environmental factor was subsequently recognized with greater clearness and with less exclusiveness by Spencer; while Darwin and Wallace, recognizing some truth in most of the above positions, but believing them wholly insufficient, left the problem of the origin of variations alone, and devoted their strength to establishing the theory of the origin of species by means of natural selection, a view which emphasizes the destructive, or eliminating, and the conservative, or selective, action of the animate and inanimate environment in the struggle for existence.

Even from the above brief sketch of representative conclusions, it will be seen that successive authors accent diverse factors in the evolutionary process; in the view of one the organism has a motor power of variation inherent in its very constitution, or gained by the intermingling of sex elements from which the individual life starts; to another the molding power of changed function, the perfecting influence of exercise, the degenerating nemesis of disuse are all important; while to a third organisms seem to have been hammered from one shape into another by the action of that complex series of external influences which we briefly term the environment. Among modern naturalists we find champions of each of these three positions respectively emphasizing (a)the organism itself, (b) its function, and (c) its environment; a few remain more or less exclusive Natural Selectionists, with or without theories of the origin of the variations which they postulate; while the majority more and more incline to an eclectic but not yet synthetic view, differing chiefly in regard to the relative importance of the various factors recognized.

Modul Explanation of Organic Evolution.—The conception thus reached of the measure of evolution of a species being expressible in terms of the progress of its (a) self-maintaining and (b) species-maintaining functions is equally capable of statement in biological, psychological, sociological, or indeed also, as moralists are now agreeing, in ethical terms; what are termed egoistic or altruistic actions being respectively self-maintaining or species-maintaining ones, of course at different levels of evolution. Here, then, we have a basis for the required inquiry as to the mechanism of the evolutionary processes. The evolutionist at any rate will not dispute this parallelism be-

#### Evolution

tween the non-ethical aspects of organic evolution, nor deny that the results and processes of evolution in their highest manifestations may be of service in elucidating or criticising the similar ones which must be supposed to exist in less developed forms. Hence he would be in some respects even better justified in tracing the evolutionary process down from the highest aspects to the more simple ones, and from the human species to humbler ones, than conversely. A classical statement of the central difficulty, of which the Darwinism and the morals are alike unexceptionable, and the resultant dualism therefore clearly set forth, may be quoted from Huxley: "From the point of view of the naturalist, the world is on about the same level as a gladiator's show. We must say that its governing principle is intellectual, and not moral, that it is a materialized, logical process accompanied by pleasures and pains. Society differs from nature in having a definite moral object. The ethical man tries to escape from his place in the animal world founded on the free development of the principle of non-moral evolution, and to found a kingdom of man, governed upon the principle of moral evolution. For society not only has a moral end, but, in its perfection, social life is embodied morality. But the effort of the ethical man to work to a moral end, by no means abolished, perhaps has hardly modified, the deep-seated organic impulses which impel the natural man to follow his non-moral course." The general drift of the contemporary discussion is beginning to be apparent; all theories and criticisms have hitherto started with the individual as a unit, and the origin and differentiation of the self-maintaining structures and functions as the primary problem; after which the origin and differentiation of reproductive and species regarding proc-esses have been left only a secondary and sub-sequent place. This method of approach, however natural to the individual thinker, is artificial as respects nature. The correspond-ing progress in the historic and individual world from sex and family up to tribe or city, nation and race, and ultimately to the conception of humanity itself, also becomes increas-ingly apparent. Competition and survival of the fittest are never wholly eliminated, but reappear on each new plane to work out the predominance of the higher, the more inte-grated and associated type. But this service no longer compels us to regard these agencies as the essential mechanism of progress, to the practical exclusion of the associative factor upon which the victory depends. For we see that it is possible to interpret the ideals of ethical progress, through love and sociality, cooperation and sacrifice, not as mere utopias contradicted by experience, but as the highest expressions of the central evolutionary process of the natural world.

**Evolution**, in mathematics, the process of extracting the roots of numbers or quantities. **Ewell**, BENJAMIN STODDERT (1810–), Ameri-

**Ewell**, BENJAMIN STODDERT (1810–), American mathematician, b. in Washington, D. C., June 10; graduated at West Point twenty-two

#### Exchange

years later and served there until 1836 as professor of mathematics and philosophy. He afterward became professor, successively, at Hampden-Sidney, Washington College, and William and Mary, and of the latter college he was elected president in 1854. He served in the Confederate army until the close of the war, when he was again elected president of William and Mary College. He was made an honorary member of the Royal Historical Society of Great Britain in 1880, and Hobart College conferred upon him the degree of LL.D. in 1874. His brother, RICHARD STODDERT (1817-1872), b. in Georgetown, D. C., and educated at West Point. He served in the Mexican War and against the Apaches in New Mexico. He entered the Confederate army in 1861, where he was soon made major general. While serving under Jackson's death. He took part in the battles fought at Winchester. at Gettysburg, and in the Wilderness, but was defeated and captured with his whole command by Sheridan, April 6, 1865.

**Ewing**, THOMAS (1789-1871), an American statesman, b. in Va. In 1831 and 1850 was elected to the U. S. Senate. In 1841 appointed secretary of the treasury. He was the first man to hold the office of secretary of the interior, to which office he was appointed by Fillmore in 1849 and which he held until 1850. In the U. S. supreme court ranked among the foremost lawyers of the nation.

**Exchange**, a place in large commercial towns where merchants, agents, bankers, brokers, and others concerned in commercial affairs meet at certain times for the transaction of business. The institution of exchanges dates from the sixteenth century. They originated in the important trading cities of Italy, Germany, and the Netherlands, from which last-named country they were introduced into England, and from thence to the United States. In some exchanges only a special class of business is transacted. Thus there are stock exchanges, corn exchanges, coal exchanges, cotton exchanges, etc.

Exchange, in commerce, that species of transactions by which the debts of individuals residing at a distance are canceled by order. draft. or bill of exchange, without the trans-mission of specie. Thus, a merchant in Chicago who owes for \$500 worth of goods in New York, gives a bill or order for that amount which can be negotiated through banking agencies or otherwise against similar debts owing by other parties in New York who have pay-ments to make in Chicago. The creditor in New York is thus paid by the debtor in Chicago, and this contrivance obviates the expense and risk of transmitting money. The process of liquidating obligations between different nations is carried on in the same way by an exchange of foreign bills. When all the accounts of one country correspond in value with those of another, so that there is an even balance, the exchange between the countries will be at par, that is, the sum for which the bill is drawn in the one country will be the ex-

## **Excito-motor Action**

act value of it in the other. Exchange is said to be at par when, for instance, a bill drawn in New York for the payment of £100 sterling in London can be purchased there for £100. If it can be purchased for less, exchange is under par and is against London. If the purchaser is obliged to give more, exchange is above par and in favor of London. Although the thousand circumstances which incessantly affect the state of debit and credit prevent the ordinary course of exchange from ever being precisely at par, its fluctuations are confined within narrow limits, and if direct exchange is unfavorable between two countries, this can often be obviated by the interposition of bills drawn on other countries where an opposite state of matters prevails.

**Excl'to-motor Action**, the action of nerves distributed to muscular organs the stimulation of which leads to movement. Thus, irritation of a nerve supplying a muscle will lead to contraction of the muscle by excito-motor action, and irritation of certain nerves distributed to blood-vessels will lead to contraction of the vessel by acting on its muscular coat.

**Exe**, a river of England which rises in Exmoor, in the county of Somerset, and after a southerly course of about 50 miles falls into the English Channel at Exmouth.

**Executive,** that branch of the government of a country by which the laws are carried into effect or the enforcement of them superintended. The term is used in distinction from the *legislatire* and the *judicial* departments, and includes the supreme magistrate, whether emperor, king, president, or governor, his cabinet or ministers, and a host of minor officials.

Exec'utor, in law, is one appointed by a man's last will to carry its provisions into execution after the testator's death. The testator may, by the common law, appoint any person of sound mind and discretion, though otherwise under some legal disabilities as to contracting and transacting business in general, such as a married woman or a minor. The duties of executors and of administrators are, in general, the same, the difference of the two depending mostly on the mode of appointment, the executor being nominated by the . testator, the administrator being appointed by the judge of probate. An executor is liable for any loss occurring to the estate through negligence; for paying legatees before all debts are discharged.

**Exegesis** ( $-j\bar{e}$ 'sis), the exposition or interpretation of the Scriptures. The science which lays down the principles of the art of sacred interpretation is called *exegetics* or *hermeneutics*.

Exeter, a city, river-port, and parliamentary and municipal borough of England, in the county of Devon, on the left bank of the Exe, 10 mi. n.w. from its outlet in the English Channel. Among the objects of interest are the cathedral (founded 1112), the remains of the castle of Rougemont, the Guildhall, the Albert Memorial Museum, St. Michael's Church, etc. Exeter has iron foundries, 'manufactories of agricultural implements, paper mills, etc., and "Honiton" lace is also made. By means of a canal vessels of 300 tons can reach the city. Excter is a place of remote antiquity, having been a British settlement long prior to the invasion of the Romans, by whom it was called *lsea Damnoniorum*. Pop. 37.580.

called Isca Damoniorum. Pop. 37,580. Exeter College, Oxford, a college, originally called Stapledon Hall, founded in 1314 by Walter de Stapledon, bishop of Exeter, who made a foundation for a rector and twelve fellows. In 1404 Edmund Stafford, bishop of Exeter, added two fellowships and obtained leave to give the college its present name.

Exhibition, INDUSTRIAL, an exhibition of works of industry and art for the purpose of exciting public interest and promoting trade and manufactures. In 1798 an industrial exhibition of the products of French industry was held at Paris, and proved so successful that in 1802, during the consulate of Napoleon, another was held. The beneficial effects of these exhibitions were so obvious that a series of them was held at intervals, the eleventh and last being held at Paris in 1849. In Britain exhibitions of a more or less local nature had been held in Dublin (1829), Manchester, Liverpool, and Birmingham, and annually in London in the premises of the Society of Arts. In 1855 the first French Exposition Universelle was opened in Paris. The buildings were erected in the Champs Elysées, and covered about 24 acres. There were in all about 24,000 exhibitors. This was followed by the national exhibitions of the Dutch at Haarlem and the Belgians at Brussels, both in 1861, and the following year by the second great international exhibition held in London. The second French International Exhibition was opened on April 1, 1867, and closed on November 3. It was erected on the Champ de Mars, and covered about 37 acres. The exhibitors numbered nearly 50,000, the visitors about 10,000,000. A great exhibition was held at Philadelphia in 1876 upon the occasion of the centennial festival of the American Declaration of Independ-It occupied 60 acres, and had nearly 000 visitors. A third French Interence. 10,000,000 visitors. national Exhibition was held at Paris in 1878, the area occupied amounting in all to 140 acres, the visitors numbering about 17,000,000. A fourth was held in 1889, the latter being partly intended to commemorate the centenary of the French Revolution. One of the features in connection with it is the famous Eiffel Tower of iron, 984 ft. high, and thus more than 400 ft. higher than any other structure. In 1883 a series of exhibitions began at South Kensington, London, where the exhibits were confined to articles having relation to a special department. To this series belonged The Fisheries Exhibition of 1883, the Health Exhibition of 1884, the Exhibition of Inventions in 1885, and the Exhibition of Colonial and Indian products in 1886. This latter was visited by 5,550,749 persons. Besides these Edinburgh had an International Exhibition of Industry Science, and Arts in 1886, visited by 2,769,632 persons. In 1887 a Royal Jubilee Exhibition of Arts and Manufactures was opened at Man-

51

chester and visited by 4,765,000 persons. In the following year a great International Exhibition of Industry, Science, and Art was held at Glasgow, and attracted during the season 5,748,379 visitors. In 1892-93 an International Exhibition of majestic proportions was held in Chicago, Ill., to commemorate the 400th anniversary of the discovery of America. See World's Columbian Exposition.

Exogenous Plants (eks-oj'e-nus) (or Exogens), those plants whose stems are formed by successive additions to the outside. The exogens are the largest primary class of plants in the vegetable kingdom, and their increase by annual additions of new layers to the outside of their stems, formed in the cambium between the wood and the bark, is a feature in which they differ essentially from endogens, whose wood is formed by successive augmen-tations from the inside. The concentric circles thus annually formed, distinguishable even in the oldest trees, aid in computing the age of the tree. The stem and branches also exhibit a central pith and medullary rays extending outward to the bark. All the trees of cold climates, and the principal part of those in hot, are exogenous, and are readily distinguished from those that are endogenous by the reticulated venation of their leaves, and by their seeds having two cotyledons (di-cotyledonous). The parts of the flower are generally in fours or fives.

**Ex'orcism**, the casting out of evil spirits by certain forms of words or ceremonies. An opinion prevailed in the ancient church that certain persons, those particularly who were afflicted with certain diseases, especially madness and epilepsy, were possessed by evil spirits. Over such persons forms of conjuration were pronounced, and this act was called *exorcism*. There were even certain men who made this a regular profession, and were called *exorcist*. Exorcism still makes a part of the beliefs of some churches.

Expansion, in physics, is the enlargement or increase in the bulk of bodies, in consequence of a change in their temperature. This is one of the most general effects of heat, being common to all bodies whatever, whether solid or fluid. The expansion of fluids varies considerably, but, in general, the denser the fluid the less the expansion; thus water expands more than mercury, and spirits of wine more than water; and, commonly, the greater the heat the greater the expansion; but this is not universal, for there are cases in which expansion is produced, not by an increase, but by a diminution of temperature. Water, in cooling, ceases to contract at  $42^{\circ}$  F.; and has its maximum density at  $30.2^{\circ}$  F. Just before it most the foregine  $R_{12}$  being the foregine it reaches the freezing point (32<sup>o</sup>). it begins to expand again, and expands more and more rapidly as the freezing point is reached. This expansion is about one-eleventh of its bulk, and accounts for the bursting of pipes, etc., when water is freezing in them.

**Expectation,** in the doctrine of chances, the value of any prospect of prize or property depending upon the happening of some uncertain

#### Extension

event. A sum of money in expectation upon a certain event has a determinate value before that event happens. If the chances of receiving or not receiving a hundred dollars, when an event arrives, are equal; then, before the arrival of the event the expectation is worth half the money. Expectation of life, the probable duration of the life of individuals of any given age. A rough estimate of any one's expectation of life is made by calculating two-thirds of the difference between his or her present age and eighty.

present age and eighty. **Exper'iments**, an operation designed to discover some unknown truth, principle, or effect, or to establish it when discovered. It differs from observation in the fact that the phenomena observed are, to a greater or less extent, controlled by human agency. Experiment distinguishes the modern method of investigating nature, and to it we owe the rapid strides made in chemistry, physics, etc.

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strides made in chemistry, physics, etc. Exploits', RIVER OF, a river of Newfoundland. It is about 150 mi. long.

**Explo'sion**, a sudden bursting, generally due to the rapid production of gaseous matter from solids or liquids. Thus the explosion of gunpowder is due to the sudden formation and expansion of gases into which the powder is converted by chemical agency. Explosions are often caused by the elastic force of steam confined in boilers, etc.

Explo'sives are compounds practically available in war, in mining, and in general use for the sudden development of immense force. They comprise gunpowder, gun cotton, nitroglycerine with its compounds, dynamite, lithofracteur, etc.

**Expo'nent,** in algebra, the number or figure which, placed above a root at the right hand, denotes how often that root is repeated, or how many multiplications are necessary to produce the power. Thus  $a^a$  denotes the second power of the root a, that is, a multiplied by a;  $a^4$  denotes the fourth power. The figure is the *exponent* or index of the power. To express the roots of quantities fractional exponents are used: thus,  $a^{14}$ ,  $a^{14}$ , and denote the square root, the cubic root, and the n<sup>th</sup> root of a.

Ex Post Facto, in law, by something done after and bearing upon something previously done; thus, a law is said to be *ex post facto*, or retrospective, when it is enacted to punish an offense committed before the passing of the law.

**Extension**, 1, In physics and metaphysics, that property of a body by which it occupies a portion of space. Extension is an essential as well as a general property of matter, for it is impossible to form a conception of matter, however minute may be the particle, without connecting with it the idea of its having a certain bulk and occupying a certain quantity of space. Every body, however small, must have length, breadth, and thickness: that is, it must possess the property of extension. Figure or form is the result of extension, for we cannot conceive that a body has length, breadth, and thickness, without its having some kind of figure, however irregular. 2,

### Extract

In logic, extension is the extent of the application of a general term, that is, the objects collectively which are included under it; thus, the word figure is more extensive than triangle, circle, parallelogram, etc; European more extensive than French, Frenchman, German, etc. Matter and mind are the most extensive terms of which any definite conception can be formed. Extension is contrasted with comprehension or intension.

Ex'tract, a term to denote all that can be dissolved out of a substance by a specified menstruum, such as water, alcohol, ether, etc. In modern pharmacy the term is applied to two kinds of preparation from vegetables. One is got by digesting the plant in water or other solvent, and evaporating or distilling away the excess of solvent until the extracted matter is sufficiently inspissated. The other is got by bruising the plant in a mortar, separating the juice, warming it until the green coloring matter separates, and filtering it off. The juice is next heated until the albumen coagulates, and again filtered. The juice is now evaporated to a syrup, the green coloring matter added and well mixed, and the evaporation is thereafter continued until the required concentration is attained. Extracts must be capable of being redissolved, so as to form a solution like that from which they were derived. Extracts are used in cookery, medicine, and the manufacture of perfumery. See Beef, extract of; Vanilla; Lemon.

Extravasa tion, an escape of some fluid, as blood or urine, from the vessel containing it. *Blood extracasation*, in contusions and other accidents, is when blood-vessels are ruptured by the injury, and the blood finds its way into the neighboring tissues. In some accidents to the urethra and bladder extravasation of urine is a very serious occurrence.

**Extremities,** the limbs, as distinguishing them from the other divisions of the animal, the head and trunk. The extremities are four in number, in man named upper and lower; in other animals anterior and posterior.

**Exu'ma,** GREAT and LITTLE, two of the Bahama Islands. The former is 30 mi. long and 3 mi. wide, and has a good harbor. Pop. 2,300.

Eyck (Ik), HUBERT (1366-1426) and JAN VAN

(1390-1441), brothers, famous painters of the old Flemish school, b. at Maaseyck. They lived first at Bruges, whence the younger brother is called John of Bruges, and afterward at Ghent, to which they removed about 1420. Here they executed the celebrated Adoration of the Lamb for the cathedral of 1420. Ghent; a painting which, in its different parts, contains above three hundred figures, and is a masterpiece. It was in two horizontal divisions, comprising ten panels, of which only the two central ones remain at Ghent, the others being at Berlin. Jan finished the work in 1432, and returned to Bruges, where he remained till his death. His reputation became very great even during his lifetime, by his share in the introduction of oil painting: the original invention of which has been incorrectly ascribed to him by many. Jan van Eyck also introduced improvements in linear and aerial perspective, and in painting upon glass.

**Eye**, the visual apparatus of animals, consisting in man of the globe of the eye, the muscles which move it, and of its appendages, which are the eyelids and eyebrows, and the lachrymal apparatus. See Anatomy.

Eyre (år), EDWARD JOHN (1815-), Australian explorer and colonial governor. He went to Australia in 1833. In 1839 he discovered Lake Torrens, and in 1840 explored its eastern shores and the adjacent Flinders Range. He then commenced his perilous journey along the shores of the Great Australian Bight, and reached King George's Sound, in Western Australia, a distance of 1,200 mi., with a single native boy, having left Adelaide more than a year before. In 1845 he published Discoveries in Uentral Australia.

**Ezra**, a celebrated Jewish scribe and priest. Under his guidance the second expedition of the Jews set out from Babylon to Palestine under the reign of Artaxerxes I, about 458 B.C. The important services rendered by Ezra to his countrymen on that occasion, and also in arranging, and in some measure, it is believed, settling the canon of Scripture, are specially acknowledged by the Jews, and he has even been regarded as the second founder of the nation. Josephus states that he d. in Jerusalem; others assert that he returned to Babylon, and d. there at the age of 120 years.
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